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ELECTRICAL IMPROVEMENTS IN SMALL TOWNS.

In large cities the advent of improved electrical equipment tends to stimulate more business for the central station, but the magnitude of the installation is often the deciding factor in the amount of attention attracted from the public. It is worth realizing how much improvements mean on the smaller scale of the little town, where the introduction of one or two gas-filled lamps may be the talk of the main street for a week. If it can be so expressed, the proportional influence of a comparatively small installation strictly up-to-date may be greater in the small town than in the city. This is a real help to the manager of a small property, since his friends and neighbors in business can often be fitted out with the latest equipment on a small scale at a cost far below that required in a larger community, and the commercial "pulling power" of even a small but advanced device is remarkable in many little towns.

Central-station managers easily fall into the habit of regarding these improvements largely from the engineering standpoint, which is necessary and desirable, but in handling small properties, the individual-interest factor of an installation is very important. Thus, a druggist in a seaside town recently equipped his store with indirect lighting. The installation was the only one of its kind in the place, and although it consisted of only three inverted reflectors, each used in connection with a 100-watt tungsten lamp and a well whitened ceiling, the "tone" imparted to the establishment made the store a marked place in the eyes of the inhabitants. Here the expenditure of a modest sum put the store on an entirely different plane from all the others in the place, arousing a good deal of interest among the villagers and instantly attracting the patronage of the city visitor, accustomed as he was to trade at home in establishments paying scientific attention to modern illumination.

Of course, the preëminence of such a store lasts only a short time by the introduction of a comparatively inexpensive layout of equipment; but one thing leads to another in small-town central-station operations, and local feeling can be appealed to very effectively by inducing one merchant to install the latest equipment known to the industry. Others want the same thing soon, and the central station gets the benefit of such progress at a very small cost.

A NEED FOR GREATER PUBLICITY.

The cultivation of the good will of its customers is one of the most important duties of the central-station company, for upon this depends the success or failure of the enterprise. It seems impossible that any company which is familiar with the fundamental ethics of the central-station industry can ignore the principles and policies for which all progressive companies now stand, and while it is doubtless true that there have been electric companies, as well as others, which in times past have failed to recognize and meet fully their obligations to the public, still it is doubtful if the cases have been as numerous as indiscriminate criticism would imply.

However, today, practically without exception, all central stations are striving to carry out the "public-be-pleased" policy by rendering good service at reasonable rates and according the public fair and liberal treatment. Together with these cardinal principles emphasis has been placed upon the education of employees for their own welfare as well as their companies', and definite plans have been quite generally adopted for bettering the conditions of employees and increasing their loyalty and efficiency to their companies in the service of the public.

It is undeniable that a strong and efficient public utility in any community is a distinct asset to the entire community. It is invariably one of the largest taxpayers, and through its service promotes industrial development and general business activity. The progressive central-station manager of today will be found as a leader in all civic affairs, working faithfully for the improvement of the community and his company usually is found at the head of the list when contributions or support are needed for some civic event.

These facts are well known among central stations, but does the public know of them? We quote at some length in this issue from a paper presented by Mr. E. Burt Fenton before the Ohio Electric Light Association in annual convention at Cedar Point, dealing with public relations and discussing the very questions that are uppermost in the minds of central-station executives, namely, what is the visible effect of good-will advertising and does it pay? Mr. Fenton is emphatic in the assertion that if there is a feeling of dissatisfaction, distrust and unrest among the public—and there is some of this in almost every community—intelligent good-will advertising will bring about a better feeling, provided it is backed up by performance. This is proved ordinarily by the dropping off of complaints and the friendlier expressions regarding the company's activities heard from the outside.

There is no hard and fast definition of the term "good will," and there is no slide-rule method of checking the results of good-will advertising. Anything that will attract the attention of the customer, interest him, enlighten him regarding the service and prompt him to think better of the company is good-will advertising.

Too much emphasis cannot be placed on the value of intelligent and consistent newspaper advertising to cultivate the good will, providing, of course, that it is conscientiously backed up in every department of the business. But almost of equal importance is the gaining of favorable publicity through the newspapers and other channels that are found in every community. If free fan service is given the sick, if free energy is supplied for a civic federation, if heroic action on the part of employees averts a protracted interruption to service, etc., tell the public. These are legitimate news items which are of inestimable value in gaining the recognition and good will of the public.

The central-station industry is suffering from false modesty. The recognition of its just claims for public support lies in greater publicity of the policies which are now so uniformly adopted by progressive companies.

INJUNCTION IN SPRINGFIELD RATE CASE.

A little more than one year ago the Public Service Commission of Missouri issued an opinion and order making a large reduction in the electric rates of the Springfield Gas & Electric Company, which operates in Springfield, Mo. The maximum rate was placed at eight cents per kilowatt-hour. The estimated revenue was based upon a rate of return of seven per cent upon a valuation which the company claimed was absurdly low. The matter was taken into court and a preliminary injunction has recently been issued by the federal court for the Southern Division of the Western District of Missouri. The opinion of the court shows that no doubt exists in the minds of any of the sitting judges as to the propriety of issuing such an injunction, since the operation of a confiscatory rate will do irreparable injury to the operating company, whereas injury to the consumers can be entirely obviated by a return of excess charges in case the final decision of the matter goes against the company. To this end a bond is required and a temporary rate with a ten-cent maximum will be put into effect. The old maximum rate of this company was 15 cents per kilowatt-hour.

The opinion of the court calls attention to the indefiniteness of the allowance made for intangible values and questions whether the Commission has followed the requirements of the law in not itemizing these. It also indicates a serious doubt as to its agreement in the allowances for other items of the valuation. The attitude of the court shows clearly that the utility corporation will have its rights fully protected by the court, and it is this opportunity for review of commission orders that makes this method of regulation a feasible one, which, in the long run, can be depended upon to secure justice to both operating companies and the public.

MAINTAINING THE LIST PRICES OF THE MANUFACTURER.

Ever since the idea of establishing commercial departments in central stations for increasing the utilization of electrical energy took root, the question of maintaining manufacturers' list prices has received a lot of attention. The function of the central station is to generate electrical energy. The duty of the management which has accepted the responsibility of making an adequate return to the stockholders who have risked their money in the venture is to build up a profitable demand for the energy available. As station capacity increases and a more favorable control of the diversity through intelligent solicitation of connected load and advantageous local conditions allow, the central-station company is able to establish rates for service which will attract customers under all conditions of living to its lines. In attracting customers, the central stations, like the purveyors of every other form of service, have found it expedient to offer premiums in the form of considerable discounts for standard electrical equipment. The dealers in electrical merchandise consider this a particularly iniquitous practice, as it takes from them the opportunity for sale, at a profit, of these devices.

As the industry has developed there has been ample justification for the determination upon the part of the central station to build up its load at the sacrifice of ultimate profits upon the sale of electrical appliances largely because in many localities there have not been available the agencies of distribution and the means for a vigorous solicitation necessary to place in the hands of the prospective user the devices which under operation maintain an adequate demand upon the station capacity. As the utilization of electrical energy becomes more general, and the rates for service go down, the difficulty of selling electrical appliances becomes less apparent. Consequently, there is a growing tendency upon the part of central stations to maintain manufacturers' list prices and to establish special sales campaigns at less frequent intervals, and then only in connection with predetermined arrangements with local dealers, so that all may co-operate to the maximum advantage.

In this connection, the general letter sent from the executive offices of one of the big Pacific Coast electric light and power companies to heads of departments, district managers and district superintendents, as follows, will be of interest to the electrical industry and the working out of its suggestions eagerly watched:

"Effective July 1, 1915, electrical appliances will be sold at the list prices of the manufacturer, less a discount of five per cent for cash at time of purchase, with the exception of incandescent lamps, which will be sold strictly in accordance with the list prices of the manufacturer, as is now the practice.

"Newspaper advertising will not make reference to any particular make of appliance and will announce the fact that appliances may be purchased from local dealers as well as from the power company.

"Advertising matter in the form of booklets and circulars as furnished the company by the different manufacturers will be distributed only when same bears the following imprint: "For sale by your electric light and power company and by dealers in electrical supplies."

"Special sale campaigns which may be deemed advisable from time to time will only be conducted on special advices from this office."

These commendable instructions are indicative of the growing realization by progressive central-station men that the best interests of the entire electrical industry are best promoted by hearty co-operation between all its interrelated branches.

ELECTRICAL PROSPERITY WEEK.

The Society for Electrical Development is distributing a 20-page booklet revealing the plans for Electrical Prosperity Week to be held November 29 to December 4, 1915. Anyone in the electrical industry, whether members of the Society or not, who has not secured a copy of the booklet may do so by application to the executive offices in the Engineering Societies Building, 29 West Thirty-ninth Street, New York City. The booklet explains what Electrical Prosperity Week means and indicates the tremendous opportunity available for co-operation among central stations, electrical manufacturers, jobbers, contractors, dealers, local electrical organizations, department stores, non-electrical merchants, public schools, women's clubs, the Electric Vehicle Association of America, the Jovian Order, the National Electric Light Association and the public generally.

The propaganda which the Society will furnish and the methods which it will pursue in establishing nation-wide publicity should be carefully studied. While definite arrangements for the correlation of effort in the various localities have not been announced, strong committees composed of prominent electrical men in every locality have been formed. As these committees discover ways and means to co-ordinate the work of each department of the electrical industry interested in the promotion of Electrical Week, the machinery of operation will readily get under way. The impulse resulting from this aggregation of effort, properly directed and controlled, can move the nation to a realization of the benefits accruing from the utilization of electrical energy beyond any attempt made by any industry in the history of industrial and civic achievement.

If everyone waits for someone else to start something, the big possibilities of this movement will not be speedily revealed. The Society has thrown the switch. It remains to be seen whether the industry will generate a volume of energy that will keep the circuit alive. This is every one's job in the electrical industry and the Society is available to lead the way and explain the motions. Undoubtedly we all of us require definite instructions as to how we should make use of the opportunity the Society offers, and this being the case, one of the first things we should do is to deluge the Society with the slogan, "We are here and ready—how shall we go about it."

Convention Papers of Illuminating Engineering Society.

The preliminary program of the ninth annual convention of the Illuminating Engineering Society, which is to be held at the New Willard Hotel, Washington, D. C., September 20-23, inclusive, has been announced. The papers, which promise to be of an unusually high standard, are to be distributed over ten sessions. One of the sessions will be devoted especially to the subject of street lighting; commercial, general, and laboratory papers will each be given three sessions. Parallel sessions will be held on Wednesday morning and afternoon and Thursday morning. Inspection trips, a reception, and a banquet are among the entertainment features.

The following papers are to be presented:

"Tests and Experiments in Connection with the New Commonwealth Edison Company Building," by W. A. Durgin and J. B. Jackson, Chicago.

"Ship Lighting," by H. A. Hornor, New York Shipbuilding Company, Camden, N. J.

"Illumination Efficiency as Obtained in an Experimental Room," by Ward Harrison, National Lamp Works of General Electric Company, Cleveland, Ohio.

"Photometry with Portable Instruments," by W. F. Little, Electrical Testing Laboratories, New York, N. Y.

"New Test Plate for Illumination Photometers," by C. H. Sharp, Electrical Testing Laboratories, New York, N. Y.

"Incandescent Lamp Testing and Photometry," by G. W. Middlekauff, Bureau of Standards, Washington, D. C.

"Street Lighting," by F. A. Vaughn, Milwaukee, Wis.

"Arc Lamps for Street Illumination," by H. E. Clifford, Harvard University, Cambridge, Mass.

"New Types of Incandescent Lamps and Their Relation to the Street-Lighting Problems," by W. H. Rolinson, Westinghouse Lamp Company, Bloomfield, N. J.

"Ornamental Street Lighting," by T. I. Jones, Edison Illuminating Company of Brooklyn.

"How to Attack a Lighting Problem," by W. R. Moulton, Consolidated Gas, Electric Light & Power Company, Baltimore, Md.

"How Can a Combination Gas and Electric Company Render the Best Service to Customers?" by S. B. Burrows and N. H. Potter, Public Service Corporation, Newark, N. J.

"Small Incandescent Lamps and Special Illumination Problems," by R. P. Burrows, National Lamp Works of General Electric Company, Cleveland.

"Lighting of Office Buildings," by A. O. Dicker and J. J. Kirk, Commonwealth Edison Company, Chicago, Ill.

"Crova's Method of Colored-Light Photometry Applied to Modern Incandescent Illuminants," by H. E. Ives and E. F. Kingsbury, United Gas Improvement Company, Philadelphia, Pa.

"Differences in Threshold and Acuity Variations," by P. W. Cobb, Nela Research Laboratory, Cleveland, O.

"Visual Efficiency," by F. K. Richtmyer, Cornell University, Ithaca, N. Y.

"Yellow Screens," by M. Luckiesh, Nela Research Laboratory, Cleveland, Ohio.

"The Flame-Pilot Ignition of Incandescent Gas Lamps," by C. W. Jordan, United Gas Improvement Company, Philadelphia, Pa.

"Practical Illumination as Exemplified by Some Recent Installations of Incandescent Gas Lamps," by R. F. Pierce, Welsbach Company, Gloucester, N. J:

"Mercury-Arc Lamps for Industrial Lighting," by W. A. D. Evans, Cooper-Hewitt Company, Hoboken, N. J.

"Relation Between Proper Illumination and Accident Prevention,"by R. E. Simpson, Travelers Insurance Company, Hartford, Conn.

"Retinal Sensibilities in Relation to Illuminating Engineering," by P. G. Nutting, Eastman Kodak Company, Rochester, N. Y.

"The Effect of Distribution of Light on Muscular Control," by H. M. Johnson, Nela Research Laboratory, Cleveland, O.

"Effect of Various Wave-Lengths of Radiation on Eye Cataract," by W. E. Berge.

"Artificial Illumination of Interiors," by David Crownfield, Pettingell-Andrews Company, Boston, Mass.

"Lighting of State, War and Navy Buildings," by W. E. Chapman, Washington, D. C.

"Lighting of Gymnasiums and Armories With Incandescent Lamps," by A. L. Powell and A. B. Oday, Edison Lamp Works, Harrison, N. J.

"The Effect of Surrounding Gas on an Incandescent Filament," by C. F. Lorenz, Nela Research Laboratory, Cleveland, O.

"The Parabolic Mirror," by F. A. Benford, Jr., General Electric Company, Schenectady, N. Y.

"Artificial Illumination in Practical Photography," by C. E. K. Mees, Eastman Kodak Company, Rochester, N. Y.

"Photographic and Visual Illumination Efficiencies," by L. A. Jones, Eastman Kodak Company, Rochester, N. Y.

"Production and Application of Ultra-Violet Light," by M. Von Recklinghausen.

"A Flux Method of Obtaining Average Illumination," by F. A. Benford and H. E. Mahan, General Electric Company, Schenectady, N. Y.

Information regarding the convention may be had upon application to the general office of the Society, 29 West Thirty-ninth Street, New York, N. Y.

Electrical Entertainment for Pan-American Delegates.

A number of the South American delegates to the Pan-American Financial Conference recently held at Washington, D. C., together with the consuls at New York City of the various South American countries, were entertained by the Western Electric Company at its New York office in the latter part of June.

The delegates, after being met by the company officials, were escorted through the engineering laboratories, where they were shown some experimental work. They were then taken to the Exhibition Room, where they had an opportunity to see and examine the various kinds of apparatus the company manufactures and sells. After partaking of an electrically cooked luncheon, the party talked on the transcontinental line with several consuls at San Francisco, through the courtesy of the American Telephone & Telegraph Company. The guests were visibly impressed by their experience and expressed their amazement at the enormous progress which has been made in the telephone art.

Fifty-Mile Canadian Line to Be Electrified.

Martin N. Todd, general manager of the Lake Erie & Northern Railway, Brantford, Ont., and president of the Galt, Preston & Hespeler Railway, has confirmed the report that the Lake Erie & Northern Railway is to be electrified for the whole 52 miles from Galt to Port Dover. Mr. Todd expects cars to be running on the Galt-Brantford line by October, and to Port Dover by November. It is likely that hydroelectric power will be used with substations at Galt, Brantford and Simcoe. It is stated that the two lines will shortly be amalgamated, with through electric railways service ultimately from Berlin to Port Dover.

Iowa Convention to be Held at Dubuque.

At the convention of the Iowa Section, National Electric Light Association, held at Keokuk last April it was voted to hold the next annual convention at Ames. This vote has subsequently been held unconsitutional and an additional vote by letter ballot taken which resulted in Dubuque being selected as the next meeting place. The convention will be held some time next April.

Electricity in Cotton Gins.

By J. H. Moseley.

This article treats fully of the processes involved in cotton ginning, with special reference to the application of electric drive. Characteristics of the motors adapted for the service are discussed and data given on the electrical operation in a number of typical plants supplied by a Texas central station. The cotton-gin field offers almost unlimited opportunity for central-station business in the South.

There are in the United States today more than 25,000 cotton gins which gin a total of 12 to 15 million bales of cotton annually. These gins represent an installed capacity of more than 2,500,000 horsepower of power-plant equipment of all kinds. This amount is almost staggering when it is remembered that the total horsepower of electric motors installed in this country is according to the census of 1912, only 4,130,619.

A standard process is involved in separating the seed from common seed cotton, the form in which it is brought to the gin. The wagon full of seed cotton is driven to the side of the gin, where a suction pipe operated by means of a fan-type blower conveys the cotton from the wagon into the gin. The cotton then goes to a distributor, and is carried into the several gin stands. From 2 to 6 gins stands are used, the usual number being 4 or 5, depending on the capacity of gin desired. The distributor may be of the pneumatic type, or of the belt-distributing type. In the former type the cotton is only taken from the wagon as fast as it is used, but in the latter type the time in which it is removed from the wagon depends on the size and speed of the fan used. The fan ordinarily unloads the cotton in about half the time required to gin same. A part of the cotton goes direct to the distributing belt, and all that this belt cannot take care of is deposited on the floor at one end of the gin stands. This cotton is then fed to the distributing belt by means of another suction pipe in the end of the gin. This suction pipe is operated by means of the same fan which unloads the cotton.

When the cotton goes into the gin stands it is fed by a mechanical arrangement onto rapidly revolving circular saws, set on a shaft close enough together so that the seed will just have room enough to drop between them. These saws, which vary in diameter from 12 to 16 inches, run at about 400 revolutions per minute, depending on the diameter. They tear the cotton away from the seed, which when it is finally cleaned drops into a conveyor directly below the saws, and is carried to the waiting wagon or to the seed house, in case the ginner has purchased

Two 75-Horsepower Motors (In Background) Driving four 80-Saw Gin Stands and Unloading Fans.

the seed. Air is sometimes used instead of conveyors for moving the seed, and comment will be made later on this point. The cotton is removed from the saws by means of a set of brushes, which rub against the saws, or by means of an air blast of about 10-ounces pressure. Both methods are in use at present. While the air method will give possibly a better sample there is a larger opportunity for waste of power. However, this latter difficulty can be overcome by using proper methods. When the cotton is brushed off or removed from the saws it is carried into a lint flue, where air is used to carry the lint cotton to the baling machinery. Before it reaches this part of the gin, however, it passes over a screen or cleaner, where as much as possible of the dirt is removed.

As the lint cotton comes from the gin stands or lint flue it falls into a rectangular opening approximately 3 feet wide by 4 feet long and 10 feet deep. This is built of heavy timbers, and the lower part revolves on a turntable. As the cotton falls in, it is tramped down by means of a mechanical piston or tramper, as it is called. The tramper pushes the cotton down into the lower part of the box, and iron dogs on each side of the box prevent it from rising back, due to its own elasticity. When all the bale has gone through the gin stands and the ginner calls: "All out!" the press man operates the turn table and brings the tramper box directly over a piston operated by a hydraulic pump. At the same time another tramper box on the other side of the turn table is brought under the tramper and another bale is started in. The hydraulic pump is then started and the bale pressed up to standard size, at which point the ties are put in place and the pump pressure released. The elasticity of the cotton then forces the ties to tighten and the bale is taken from the press, weighed and placed in the owner's wagon or in a nearby cotton yard.

This, in brief, is the way all gins are operated. It will be noticed that there are three distinct stages involved: (1) Removing cotton from the wagon and putting it through the gin stands. (2) Packing cotton in the tramper box. (3) Pressing out the bale. It seems logical, therefore, that these three stages should be separately considered in the electrification of the cotton gin, and such is the case.

Some time ago in localities where good boiler water could not be secured the internal-combustion engine entered into the ginning field and introduced an evil which has only recently been satisfactorily overcome. When this kind of motive power was applied to the cotton gin it was necessary to find, first, a method of operating the tramper, since this had been operated in the steam-driven gin by means of a double-acting steam cylinder, and, secondly, a means of operating the press pump, which had formerly consisted of a direct-driven steam-hydraulic affair. Mechanical trampers were known at this time as were also belt-driven hydraulic pumps, but these required special clutches or tight and loose pulleys and led to consequent trouble. There was one thing, however, which could be used on both these parts of the gin, and which could be installed at a minimum expense, and that one thing was an air compressor. Hence the introduction of the air compressor into the gin plant. By operating an air compressor from the main line shaft the same tramper and the same steam hydraulic pump could be used. Of course a loss in efficiency occurred, but at this time little thought was given to operating costs, due to the inherent operating characteristic (short periods of operation) of the gin.

When electric power was talked of it naturally followed that the air compressor was also considered. Hence in most of the gins in operation in Texas today the following arrangement has been usually followed.

A high-speed motor is belted to the main line shaft driving the gin stands. To this line shaft is belted usually a 6-by-6 duplex or 6-by-8 duplex compressor, which operates the tramper and hydraulic pump. In many cases the fan is driven by a high-speed direct-connected motor, thus eliminating friction of belt and loss of power in possible jack shafts. A separate direct-connected motor-driven unloading fan is used in the cotton house for unloading cotton that is to be stored. An air drum 3 feet in diameter by 7 feet high is connected directly in the air line to insure a steady supply of air. This is necessary, especially on account of the operation of the air-driven pump, which requires a large amount of air intermittently at from 60 to 100 pounds pressure.

The Texas Power & Light Company, which operates in a section containing many gins, has advocated the use of a separate motor-driven hydraulic pump, in order to be able to use a lower air pressure. This has been found an economical proposition, as 30 or 40 pounds air pressure will operate the tramper, while 60 to 100 pounds is required to press out an ordinary size bale with an air-driven hydraulic pump.

Typical Motor Drive in Cotton Gin.

Motor Requisites.

It is rarely the custom to install more than five 80-saw gin stands in one battery. When more capacity is required two or more identical batteries are used. On this account the largest size motor usually used is not over 75 horsepower. Since the characteristics of gin operation require a simple source of power and a source capable of overloads, due to the varying grades of cotton ginned, the squirrel-cage induction motor is readily adapted to this class of service. Due to the loose lint, which collects around the gin plant, a brushless-type motor is essential. Simplicity of construction and operation makes the constant-speed squirrel-cage type motor an ideal unit for a cotton gin, and universal satisfaction has resulted where this type has been used.

In order to avoid transformer losses a primary voltage of 2,200 is used on all motors above 25 horsepower in the Texas territory. For unloading fans,

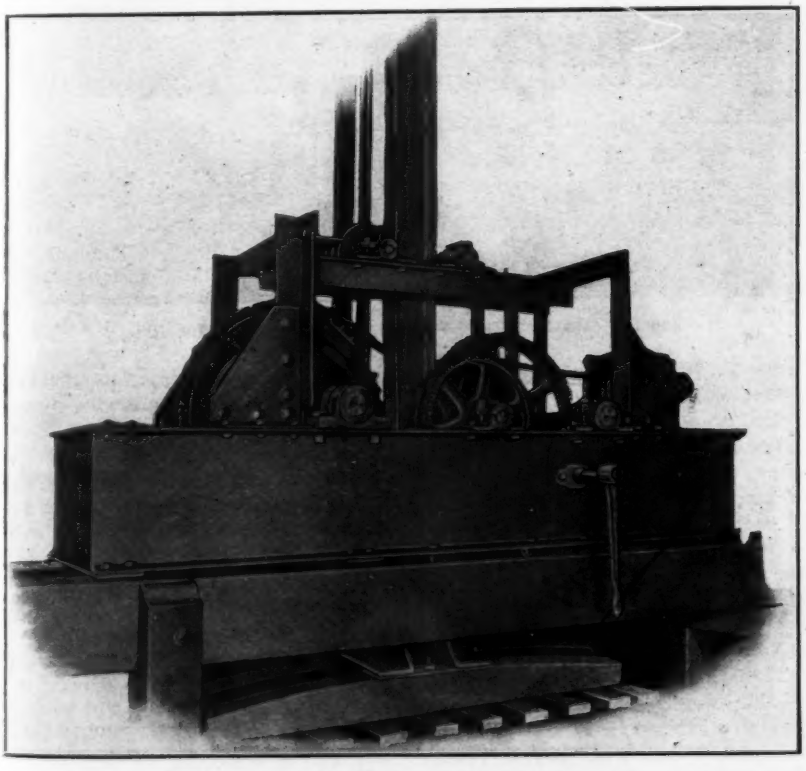
Electric Gin Advertising Quick Service as a Feature.

motor-driven hydraulic pumps, and electrical trampers, 220-volt motors are commonly used.

The only difficulty experienced in using induction motors is that of line regulation. During the first and last of the season the cotton gin runs only intermittently, and consequently it is necessary to start and stop the motor many times during the day. On a small isolated plant a 75-horsepower induction motor will practically destroy all attempts toward good regulation and on plants of small capacity it is advisable to use a wound rotor with a time-limit controlling switch for starting. It is also advisable to use wound-rotor motors on individual installations of 100 horsepower or more, in order to decrease the starting current.

The One-Motor Gin.

Undoubtedly the cheapest way of changing from a steam-driven to an electrically-driven gin is to replace the steam prime mover with one motor, a small air compressor being belted to the main line shaft, to furnish air for the tramper and hydraulic pump. No trouble whatever should be experienced with an installation of this character. However, when the bales are coming in slowly it is necessary with this type of installation to operate the entire gin plant, in order to furnish air for pressing out the bale. The large friction loss prevalent in the gin proper during this part of the operation causes a large power consumption and a correspondingly high cost per bale of cotton ginned.



New Type Electric Tramper for Baling Cotton.

Two-Motor Gin.

This installation can be greatly improved from the economical operation standpoint by using a hydraulic pump belt driven by a 7.5-horsepower motor. With this arrangement not only can a lower pressure be used on the air drum with consequently less power consumption, but the main gin motor may be cut off as soon as the bale has been put through the gin stands. The 7.5-horsepower motor can then be started and the bale pressed out with no loss in power. On one gin, where a record was kept, 287 bales were pressed with a motor driven hyydaulic pump for $1.08, or an average of less than two-fifths of a cent per bale.

The Logical Arrangement.

Still further economy can be effected by eliminating the air compressor entirely and replacing it with an individually motor-driven electrical tramper. In the ordinary four-stand 80-saw gin the electrical equipment would consist of one 75-horsepower 2,200-volt 60-cycle three-phase constant-speed squirrel-cage motor driving main gin stands and unloading and conveying fan (motor would operate at 900 or 1,200 revolutions per minute); one 7.5 horsepower, 220-volt, 60-cycle, three-phase, constant-speed, squirrel-cage motor, belted to hydraulic pump; one three-horsepower, 220-volt, 60-cycle, three-phase constant-speed squirrel-cage motor, driving by means of silent chain the electrical tramper.

If desired a 50-horsepower motor can be used instead of the 75-horsepower machine, and a separate 25-horsepower motor direct-connected to the fan equipment, thus eliminating some belt and friction loss. However, this is a matter of comparatively small economy and is hardly justified, due to the increased first cost of the motor equipment.

The three-motor installation is truly the logical arrangement, and the most economical installation, since it divides the gin plant into the three units, which really operate independently of each other. Maximum operating efficiency and economy are obtained by this method.

The electrical tramper mentioned has only recently been placed on the market, and has not had a thorough trial in practical operation. However, it is so simply constructed that there is small chance of trouble being experienced. One of the accompanying illustrations shows the main features of this device, which is operated by a

three-horsepower motor. This motor is connected by silent chain to a cog wheel operating the vertical member of the tramper, and is operated by means of the regular tramper-operating lever shown. Moving the lever in one direction starts the motor, and causes the tramper to move downward. When the tramper has reached a predetermined point, or has passed the press dogs the motor rotation is automatically reversed, and the tramper is caused to rise. The arrangement is very simple, and the travel of the tramper may be changed at will. The electric circuit is made and broken in a small oil tank, so that there is no danger of a spark being formed. It is not necessary for the operator to know the details of the tramper construction, as it is operated by simply moving the lever back and forth. This invention, besides doing away with the air compressor, and consequently lowering the power consumption and ginning cost, eliminates the possibility of "wet packed" bales, which frequently occur in steam-driven trampers, due to leaky cylinders.

Advantages of Electric Drive.

The electric gin has many advantages over the steam-driven gin, and already the ginner is beginning to consider this type first when contemplating the installation of a new gin.

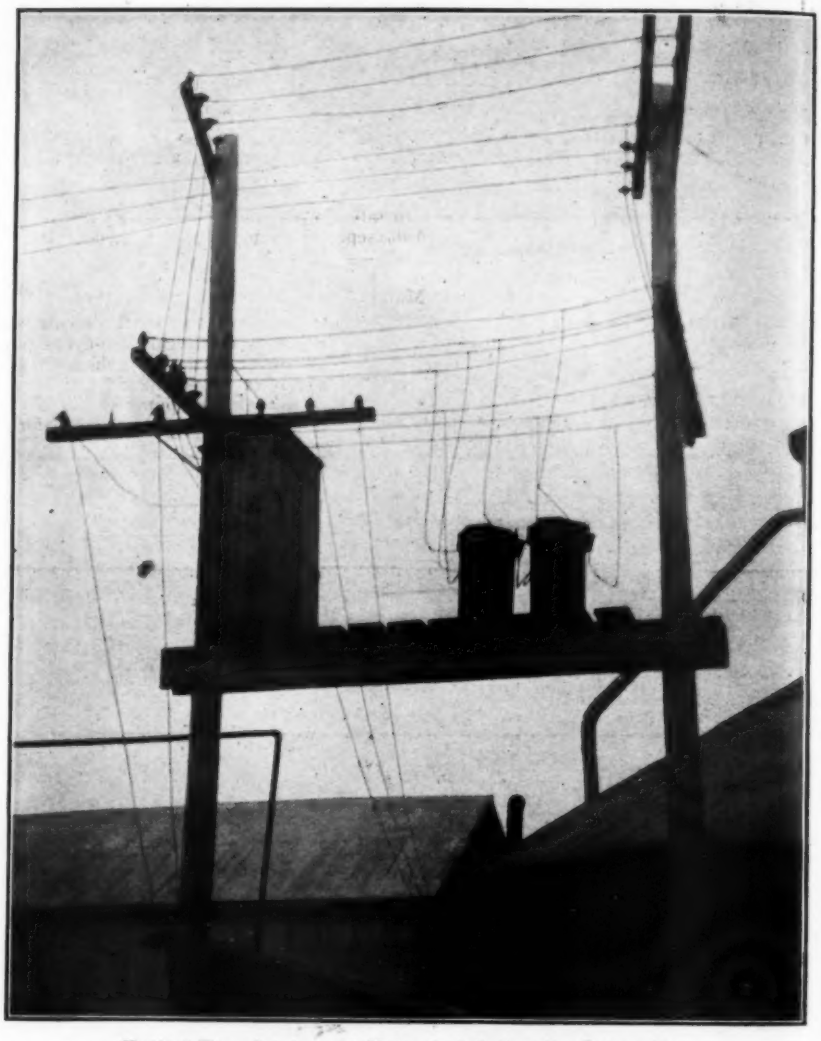
"Service," the keynote in every successful business of today, is the biggest feature embodied in the electric gin. It is always ready to operate. It is not necessary to fire up a boiler at 4 o'clock in the morning in order to be ready to do the day's ginning.

Economy is the second item of consideration. The characteristics of the gin business are such that frequently at the beginning and end of the season long periods elapse between the receipt of cotton. When it is necessary to keep a boiler fired and an engineer on the job all the time the waste in power can be easily seen. The electric gin consumes power while in actual operation, and requires no engineer or fireman at all. With a reasonable price for current the electric gin can compete with very low-priced fuel, and if it happens that the gin is located some distance from a railroad the increased cost of fuel, due to unloading and hauling, makes the operation of a steam-driven gin out of the question. Due to a lower cost of equipment the fixed charges are lower, and this is an important point when it is considered that these same fixed charges are distributed not over a year, but over a period of in most cases five months or less. Maintenance charges are also lower on the electric gin.

Elimination of the engineer and fireman is a great relief to the gin manager, not only from the standpoint of economy, but also from that of service rendered. Although the steam plant of a gin is ordinarily simple to operate, nevertheless, due to the shortness of the season, it is difficult to obtain efficient operators. The power costs in a steam-driven gin depend on the character of the operator, even more than on the price of fuel. Too much emphasis cannot be placed on this point.

Another important advantage of the electric gin is that it is absolutely independent of water supply. Alkaline water has caused many a ginner to lay awake nights wondering where the money would come from with which to replace a boiler or set of tubes which had been eaten away. In some cases, too, water has to be carried for miles, thus making the cost of this item almost as much as that of the fuel supply. While insurance companies penalize the electric gin (25 cents per $100 in Texas) on account of having no available water supply for fire purposes, nevertheless, such a large credit is allowed (50 cents per $100 in Texas) due to the lower risk, that this penalty is offset and a substantial saving effected. Small motor-driven pumps are sometimes used for fire purposes where no city pressure is available.

Simplicity is the final wedge which usually drives home the sales argument. A child can operate the power end of an electric gin. It is only necessary to take the prospect to see one electrically driven plant to impress this fact upon his mind. His eyes will take in the whole thing, and the sale will usually be consummated.



Typical Transformer and Meter Installation for Cotton Gin.

Operating Economies.

The efficient operation of an electric gin depends to a large extent upon the personal equation involved. Unless the air-blast, direct-connected gin is used a large number of auxiliary pulleys and belts are necessary. If each one of these belts are operated tighter than necessary the combined friction loss amounts to a considerable amount of the total power required to operate the gin.

Every gin should be gone over carefully at the beginning of each season. The line shaft should be carefully

Cotton-Gin Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for twenty-four hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Gin plant with six stands of 70 saws each. Capacity approximately five bales of cotton per hour. Daily operation varies from 2 to 18 hours. Number of months operated, 8.

Total connected horsepower, 127.5. Total number of motors installed, 4. Average kilowatt-hours per month, 4,612.

Kilowatt-hour consumption for 8 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	2,700	April	2,000	October	16,200
February	1,800	September	1,900	November	9,500
March	300			December	2,500

Load-factor, 6.6 per cent.

Approximate energy consumption per bale of cotton ginned is 19.2 kilowatt-hours.

Motor Installation.

Following is a list of motors installed with their respective drives. Source of supply is 220 volts, three-phase, 60 cycles with the exception of 75-horsepower motor which is 2,200 volts.

No.	Horse-power.	Speed, R. P. M.	Application.
1	75	900	Belted to main line shaft driving six 70-saw gin stands and one Gardner-Rix 6 by 6 vertical, two-cylinder air compressor.
1	25	1,800	Direct-connected to 40-inch multi-blade fan for unloading and conveying cotton to gin stands.
1	7.5	900	Belted to hydraulic pump.
1	20	1,800	Direct-connected to 35-inch unloading fan in cotton storehouse.

Gin plant with four 70-saw stands. Capacity approximately four bales of cotton per hour. Daily operation varies from 1 to 18 hours. Four men are employed. Plant operates seven months per year.

Total connected horsepower, 100. Total number of motors installed, 2. Average kilowatt-hours per month, 2,963.

Consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	311	May	0	September	4,400
February	2,610	June	0	October	6,980
March	400	July	0	November	4,350
April	0	August	0	December	1,690

Load-factor, 5.4 per cent.

Average kilowatt-hours per bale, 14.5.

Motor Installation.

Following is a list of motors installed with their respective drives. 220-volt, three-phase, 60-cycle current is used with the exception of the 75-horsepower motor which is 2,200 volts.

No.	Horse-power.	Speed, R. P. M.	Application.
1	75	900	Belted to main line shaft driving four 70-saw gin stands and one Gardner-Rix 6 by 6 vertical, two-cyclinder air compress.
1	25	1,800	Direct-connected to 40-inch unloading fan in cotton storehouse.

Gin plant with six 70-saw and five 80-saw stands, having a capacity of approximately 10 bales per hour. Daily operation varies from 1 to 18 hours. Plant operates six months per year.

Total connected horsepower, 192.5. Total number of motors installed, 5. Average kilowatt-hours per month, 4,937.

Kilowatt-hour consumption for six months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	580	September	11,400	November	5,010
February	121	October	12,050	December	460

Load-factor, 4.7 per cent.

The approximate energy consumption per bale ginned is 17 kilowatt-hours.

Motor Installation.

Following is a list of motors installed with their respective drives. Current is supplied at 220 volts, three-phase, 60 cycles.

No.	Horse-power.	Speed, R. P. M.	Application.
1	75	900	Belted to main line shaft driving six 70-saw gin stands and suction fan.
1	15	1,200	Belted to 8 by 6 Gardner vertical air compressor furnishing air for tramper.
1	75	900	Belted to main line shaft driving five 80-saw gin stands and 6 by 6 Gardner vertical air compressor.
1	7.5	900	Belted to hydraulic pump which operates the hydraulic ram on two presses.
1	20	1,800	Direct-connected to 35-inch unloading fan in cotton storehouse.

Cotton-Gin Data—Sheet No. 2.

Gin plant with four 70-saw stands having a capacity of approximately four bales of cotton per hour. Daily operation varies from 1 to 18 hours. There are four men employed. Plant operates five months per year.

Total connected horsepower, 95. Total number of motors installed, 2. Average kilowatt-hours per month, 7,815.

Kilowatt-hour consumption for five months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	3,960	May	0	September	11,580
February	0	June	0	October	16,280
March	0	July	0	November	6,630
April	0	August	0	December	620

Load-factor, 15 per cent.

Approximate energy consumption per bale of cotton ginned, 18 kilowatt-hours.

MOTOR INSTALLATION.

Following is a list of motors installed with their respective drives. Three-phase, 60-cycle, 2,200-volt current is used on 75-horsepower motor and 220 volts on 20-horsepower motor.

No.	Horse-power.	Speed, R. P. M.	Application.
1	75	1,200	Belted to main line shaft driving four 70-saw gin stands; suction fan and 6 by 8 Gardner vertical two-cylinder air compressor.
1	20	1,800	Direct-connected to 35-inch unloading fan in cotton storehouse.

Gin plant having eight 80-saw stands. Capacity approximately 10 bales of botton per hour. Daily operation varies from 1 to 18 hours. Plant operates six months per year.

Total connected horsepower, 235. Total number of motors installed, 7. Average kilowatt-hours per month, 11,820.

Kilowatt-hour consumption for six months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	0	May	0	September	12,411
February	10,100	June	0	October	26,300
March	700	July	0	November	18,100
April	0	August	0	December	3,311

Load-factor, 9.2 per cent.

The approximate electrical energy consumption per bale of cotton ginned is 18 kilowatt-hours.

MOTOR INSTALLATION.

Following is a list of motors installed with their respective drives. The source of supply is 2,200-volt, three-phase, 60-cycle current for the two 75-horsepower motors and 220-volt for the balance.

No.	Horse-power.	Speed, R. P. M.	Application.
2	75	1,200	Each belted to a line shaft driving four 80-saw gin stands and suction fan.
2	15	1,200	Each belted to an 8 by 6 Gardner vertical two-cylinder compressor furnishing air for trampers and hydraulic pumps.
2	20	1,800	Each direct-connected to a 35-inch unloading fan in cotton storehouse.
1	15	900	Auxiliary motor for seed conveyor.

Gin plant having four 70-saw stands. Capacity of plant is approximately four bales of cotton per hour. Daily operation varies from 1 to 18 hours. Plant operates six months per year.

Total connected horsepower, 107.5. Total number of motors installed, 4. Average kilowatt-hours per month, 3,671.

Kilowatt-hour consumption for six months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	2,290	July	0	September	10,320
February	600	August	0	October	10,300
March	0	May	0	November	2,150
April	0	June	0	December	1,340

Load-factor, 6.2 per cent.

The approximate electrical energy consumption per bale of cotton ginned is 17.2 kilowatt-hours.

MOTOR INSTALLATION.

Motors are installed as follows, 220-volt, three-phase, 60-cycle current being used except on the case of the 75-horsepower motor, which is 2,200 volts.

No.	Horse-power.	Speed, R. P. M.	Application.
1	75	900	Belted to main line shaft driving four 70-saw gin stands and suction fan.
1	15	1,200	Belted to Chicago Pneumatic 6 by 6 air compressor.
1	7.5	900	Belted to hydraulic press pump.
1	10	1,800	Belted to unloading fan in storehouse.

alined and all bearings examined for defects. Belts should be repaired where necessary and all unnecessary friction eliminated. The gin saws should be sharpened or replaced if necessary and all bearings on the gins stands should be inspected. Hydraulic pumps and trampers should be looked over for worn packing, and the air-compressor line should be tested for leaks. The suction air line should also be tested for leaks, as here is a point overlooked by many operators. A small leak will make an appreciable difference in the power required to operate a fan, and several of these leaks will interfere greatly with the plant operation, actually reducing the capacity unless the fan is speeded up.

Where possible it is advisable to place an adjustable gate valve in the suction line directly adjacent to the fan casing. This valve will serve to regulate the amount of air necessary for different grades of cotton, and will prove a big power saver. Precautions such as suggested will insure satisfactory and economical operation from a mechanical standpoint. It then remains for the foreman to see that his men do the work properly.

Perhaps the biggest economy dependent on the personal equation is that gained by making the bales follow one another as quickly as possible. The foreman should see to it that just as soon as one bale is "all out" there will be another wagon in place ready to unload. This will give increased output and a lower consumption of power per bale ginned. If only one bale is in the yard at a time he should see that the main gin motor is cut off as soon as the last of the cotton is dumped into the tramper. The press-room employees can then finish up the bale (in the case where a hydraulic belt-driven pump is used) with no waste of power in the main part of the gin.

The operation of the tramper should be entrusted to a man who will pull the cotton down out of the condenser slide and press it down into the tramper box as much as possible with a short stick. The tramper should be used with as few strokes to the bale as possible. From 10 to 15 strokes will usually suffice to tramp an ordinary size bale. It is not necessary to run the tramper below the press dogs.

It is well for the person operating the press to mark a certain spot to be used as a guide in stopping the ram. This will not only save power, but will assist him in turning out bales of a uniform size, a fact which is appreciated by all customers.

If an air-driven tramper is used in connection with a belt-driven hydraulic pump, a drum pressure of 30 to 40 pounds should be sufficient to tramp down the largest bales. The air compressor should be equipped with an unloading valve, so that the relief valve on the air drum will not be always blowing and wasting power. A three-way valve should be placed in the air line between the receiver and compressor, so that the compressor may be started without load and yet maintain the drum pressure.

Screw conveyors for carrying the seed from beneath the gin stands to the seed house are frequently neglected and can often be found dragging on the boxes in which they are installed. Such defects should be corrected, and plenty of oil or heavy grease used on the bearings. Lubrication is far cheaper than power. Some ginners will insist on blowing their seed with the air from the suction fan, arguing that this air goes to waste, anyhow, and that they might as well use it. Any obstruction, however, in the exhaust pipe will cause back pressure, and it is necessary to speed up the fan and overcome this back pressure in order to unload the cotton as fast as the gin stands will take it.

The data given in the accompanying table for a complete year's operation on 32 different gins, some of them having identical equipment, will give an idea of the variation of power consumption due to the personal equation.

No.	Stands	Saws per Stand	Horse-power Installed	Months Used	Bales Ginned	Average Weight	Kilowatt-hours Used	Average Kilowatt-hours Bale	Net Cost per Bale Cents
1	4	70	70	2	650	525	11,440	17.6	47
2	4	80	95	4	733	525	15,780	21.5	65
3	5	80	125	4	583	524	10,720	18.3	62
4	4	70	50	4	1,108	530	18,120	16.3	49
5	4	70	108	4	1,190	530	20,990	17.6	71
6	4	80	108	2	636	554	10,060	15.8	65
7	6	70	85	3	678	520	15,570	17.0	67
8	8	80	200	4	3,343	525	60,122	18.0	56
9	4	70	75	3	526	523	9,820	18.6	77
10	5	70	110	5	1,702	526	32,800	19.2	67
11	4	70	83	4	1,079	525	20,520	19.0	71
12	4	70	100	5	1,295	525	18,840	14.5	59
13	5	70	110	5	2,293	519	40,090	19.2	64
14	8	70	178	5	2,996	524	59,840	20.0	64
15	8	70	190	5	2,245	523	51,800	23.0	75
16	8	80	200	3	2,869	525	59,583	20.7	63
17	4	70	110	5	1,704	521	30,583	17.9	65
18	4	70	85	5	1,537	527	32,020	20.8	71
19	4	70	75	3	750	522	10,488	14.0	54
20	4	70	95	5	2,169	515	39,070	18.0	62
21	8	70	195	5	2,017	526	43,937	21.8	73
22	4	70	83	5	490	524	12,975	26.4	112
23	5	70	100	5	1,649	520	43,250	26.2	87
24	5	80	90	5	1,119	518	27,500	24.6	89
25	4	80	90	5	1,034	527	27,260	26.3	94
26	4	70	90	5	1,881	525	22,580	12.0	45
27	4	70	90	4	837	507	15,482	18.5	72
28	4	70	85	4	1,602	514	31,890	19.9	68
29	8	70	158	4	1,701	566	28,920	17.0	59
30	2	70	35	2	87	500	1,850	21.0	95
31	4	70	100	4	1,746	536	30,560	17.5	60
32	8	70	200	3	4,846	536	83,950	17.3	55
	Averages			4	1,540	525	29,450	19.0	65

These data were secured by the Texas Power & Light Company, which at present is furnishing electric service to 75 Texas towns. Little effort was made last year to secure gin business, as the company wished to determine first the general effect of this class of business on its load curve. However, during the last few months 23 additional gin contracts have been obtained. These gins, representing approximately 2,500 horsepower of installed motor capacity, will be served during the coming season.

The chief difficulty which has been met with in obtaining this business has been to overcome the prejudice of the gin owner who has been accustomed to using steam-driven power. Trial installations were first resorted to, and it is gratifying to note that only in one instance have motors been removed due to dissatisfaction. When it is considered that practically all the installations have been made in competition with an existing steam plant the record shows much aggressiveness on the part of the company organization.

The total cost of steam power in a gin plant varies from 50 cents to $1.00 or more per bale, depending on the type of equipment installed, the kind and cost of fuel used and the water supply. The average cost of steam power in this section is probably 70 to 80 cents a bale. Hence the actual saving shown with electric operation is not very large, due in great part to the shortness of the operating season. While cost, of course, enters into the discussion, "service" is the real factor which usually brings the ginner around to electric drive. This is exemplified by one of the illustrations shown where the gin is advertising "Quick Service."

Iron Campaign at Portsmouth.

The Rockingham County Light & Power Company, Portsmouth, N. H., is conducting a special sale of electric flatirons for the summer months. Any one of four makes—the Simplex, General Electric, Hotpoint or Universal iron, is obtainable for $3, 50 cents cash and 50 cents a month for five months. A large number of the company's customers have embraced this opportunity to solve the problem of ironing day during the heated term.

Commercial Practice
Management, Rates, New Business

Obtaining the Good Will of the Public.

What is the visible effect of good-will advertising? How is one to know whether it pays or not? How are results to be checked? These questions were discussed in a paper before the convention of the Ohio Electric Light Association, July 20 to 23 by E. B. Fenton, publicity manager for W. S. Barstow & Company, who said that there is but one way of checking results. If there is a feeling of dissatisfaction, distrust and unrest among the public—and there is some of this in almost every community—intelligent good-will advertising will bring about better feeling, provided it is backed up by performance. You know this, ordinarily, by the dropping off of complaints, and the friendlier expressions you hear from the man on the street.

There is no hard and fast definition of the term "good will," and there is no slide-rule method of checking the results of good-will advertising. Anything that will make the John Smith you serve feel more kindly toward you; anything you can do that will accommodate or please him, anything that will prompt him to say to his neighbor, "Well, that was a decent thing for the lighting company to do,"—anything in short that will attract the attention of the customer, interest him, enlighten him about your business, and prompt him to think better of you, is good-will advertising.

It is not necessarily printed advertising.

The manner of your cashier toward customers when they pay their bills; the attitude of your complaint department toward those who bring in their grievances; the tone of voice you and your employees assume in answering the telephone; the actions of your meter readers, repair men and other employees on the premises of customers; all these little details of the daily routine of business are items of good-will or ill-will advertising, according to the policy you pursue.

When an intending customer calls up by telephone and ask you to furnish service, does your clerk answer like this?

"You will *have* to come to the office and sign an application."

Or does he politely inform the inquirer that there is a rule of the company requiring an application in writing before service can be given, with a hint that forms are kept at the office?

Each business must have rules and regulations governing its relations to the public and each company must be governed, in making these rules, by conditions peculiar to its community. As a general thing people are inherently resentful of corporation rules which put them to personal inconvenience. So the greatest care should be taken to make as few such rules as possible and to enforce those that are necessary with the view of reducing irritation to the minimum. In no place does politeness pay so well as in the office of a public utility. The average individual does not so much resent complying with a rule, as being told in a cross manner that he must.

Just a few examples of "good-will" advertising: About a year ago an "epidemic" of burglary broke out in an Ohio town. Promptly the public-service company published an advertisement under the caption, "Don't Shoot the Burglar."

It called attention to the fact that the prowling gentry are better shots than the average householder; that when the latter shoots he is more apt to hit a member of his own family than the marauder; and that in the dark, the advantages are all on the side of the burglar. Then it was pointed out that the one thing burglars actually dread is light. The advantages of electric light were exploited in a few words.

The value of that advertisement was the concern the company expressed for the safety of the people of the community it serves.

One day a customer called at the office to buy some lamps. He was urged to take Mazdas and it was explained that they were much more economical than the old-style carbon lamps.

"Any old time," sneered he, "this company tries to sell lamps that use less current, I'll make it good. Anything you recomend will use more current. You're in business to stick us poor devils as hard and as often as you can."

This remark was quoted in the advertising space of the company, the next week, with the following explanation of the company's attitude with regard to current saving devices:

"We are constantly reaching out for new business. Eventually we hope to have our electric service in every home, store, factory and out-building in Blankville. We hope to induce every consumer to use electricity, not only for light, but for the multitude of other purposes for which it can be used to the advantage of the customer.

"This goal can be reached only by making our service of value to our customers. It must be worth all they pay for it—and a little more. So it is good business to do all we can to prevent the waste of electricity—which is a waste of money. We want everybody to use our service to the largest possible extent, but we gain nothing when any customer wastes it.

"The good will of our patrons is our most valuable asset. We want to hold what we have, and add to it. If, by some sudden catastrophe, our entire plant should be destroyed, it could be replaced. That would be only a matter of money. But a lost or impaired good will can never be restored.

"Nobody ever gained or held good will by 'skinning' his patrons. But that is a sure way to lose it. We have been a long time building up ours. We cannot afford to lose any part of it. We are trying to earn more—by deserving it.

"So, when we advise our customers to use the service in such manner and with such devices as to get the largest results for the least expenditure of money, we are not 'knocking' the cash-drawer. We are investing in more good will."

The owner of an excellent residence property wanted to dispose of it. The house was built before the era of wiring all new structures for electric service, and had never been so equipped. Because of this fact, the property was a drug on the market. When it was finally sold, it was at a price several hundred dollars below its actual value. During the waiting period, the owner was willing to rent the house, but could not find a tenant, though modern houses were in great demand.

An advertisement headed "Why This Property Remains Vacant and Unsold," called the attention of other owners to the necessity for wiring their houses if they wanted to get good prices or desirable tenants. It was framed as a

friendly "tip" to landlords which, if acted upon, would benefit them.

Added to this sort of advertising, the policy was adopted of sending a friendly personal letter of thanks to each new customer—not a brief, terse business-like letter—a friendly letter, expressing the company's appreciation of the patronage bestowed upon it.

This policy was found to pay. It changed hostility and indifference to friendliness. The customer is human. Treat him with indifference or disdain and he will respond with hostility. Treat him as a friend and he will be your friend—and you never know at what moment you are going to need his friendship—and need it badly.

The preparation of good-will advertising is no task for an amateur. If you don't know your own public, inside and out—its desires, hopes, prejudices, processes of thinking, the construction it will put upon your published words—better turn the job over to someone who does. It is no reflection upon one's ability as an executive that he does not know everything—even everything pertaining to his own business. The public is a special study. How to deal with it in the acquirement of good will is a psychological problem. The average successful business man's powers in this direction are developed by dealing with individuals separately. To influence them in the mass calls for entirely different treatment.

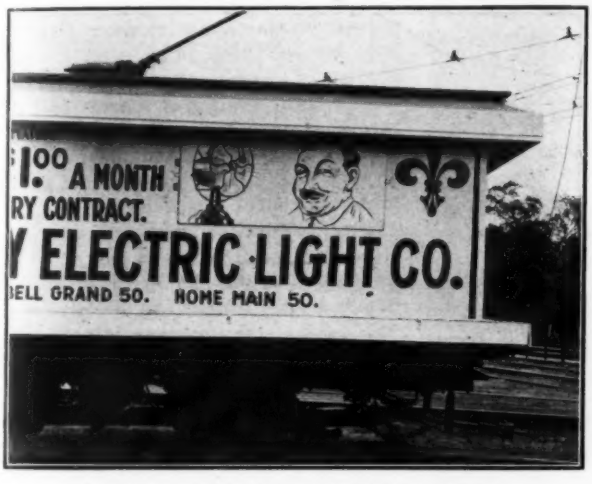
Appliance Campaign at Pueblo.

The Arkansas Valley Railway Light & Power Company has authorized a special electric appliance campaign in Pueblo, Colo., by salesmen employed by a manufacturing concern who are making a canvass of every house in the city selling appliances such as electric flatirons, toasters, table stoves, washing machines, electric cleaners, etc. The results during the first ten days of the work have been satisfactory and it is intended to continue it for 30 to 60 days. The appliances are sold at list price, the salesmen receiving a 20 per cent commission.

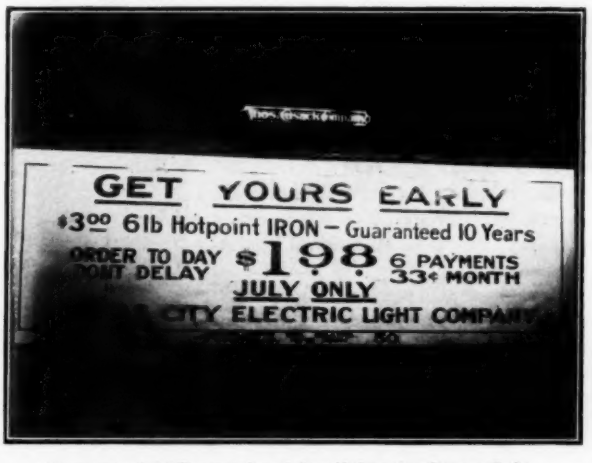
Central Station Adopts Unique Advertising.

The Kansas City Electric Light Company has been prosecuting a vigorous and successful campaign on its offer of wiring one room, supplying a lamp, an electric iron and an electric fan, for $12, payable $1 down and $1 a month. While many advertising devices are used, the company is not neglecting any that involve the use of electrical illumination. Several painted boards, all illuminated, are employed for the wiring offer; and the company also uses other illuminated boards to exploit its offer of a $3 Hotpoint iron for $1.98 in July. Both the wiring and the iron offers have met with large success.

The unprecedented wet and cool weather has somewhat hampered the fan campaign, but the higher temperature after the middle of the month stimulated the demand, and so assisted the wiring exploitation. One new feature of the advertising this month, which will be continued through the summer with different painted signs, is an illuminated, painted special street car. Within the car is a mechanical organ which attracts attention. The advertisements of the company's special offers are painted on sides and ends of the car, a flasher extinguishing and lighting the concealed globes at top and bottom. The car runs for two hours each night, in both business and residence districts. A feature of the signs is a picture on a revolving board about three feet long, of a man sweltering; the board is reversed by the flasher, the other side showing the same face wreathed in smiles, turned to an electric fan.



Street Car Converted into Portable Billboard.


GET YOURS EARLY
$3.00 6lb Hotpoint IRON – Guaranteed 10 Years
ORDER TO DAY $1.98 6 PAYMENTS
DON'T DELAY JULY ONLY 33¢ MONTH
CITY ELECTRIC LIGHT COMPANY

Illuminated Billboard for Advertising Appliance Sale.

Electric Motors Supplant Steam for Water Pumping at Wellesley.

The town of Wellesley (Mass.) obtains its water supply for domestic purposes from a group of driven wells, located on the northerly edge of the town near Newton Upper Falls. These wells, 60 in number, furnish the entire water supply of the town, amounting to 145,300,000 gallons for the calendar year 1914 or at the rate of approximately 400,000 gallons per day. The rate of consumption naturally varied during the year, reaching a maximum of 500,000 gallons per day in the month of June, or an average of 80 gallons per day per inhabitant.

The arrangement of the water system includes a pumping station located immediately adjacent to the wells, from which the water is pumped directly to two covered reservoirs having an aggregate storage capacity of 1,969,000 gallons, equivalent to 4 or 5 days reserve supply. These reservoirs, located at an elevation of approximately 250 feet above the pumping station, deliver the water to the distribution mains by gravity, at pressures suitable for all household purposes and, in many locations, at pressures ample for fire-fighting purposes.

For a period of 31 years the town has relied upon a single steam pump for the delivery of water to these reservoirs. This pump is rated at 700 gallons per minute at pressures not exceeding 120 pounds, and although still in good condition after its long service, its capacity is materially reduced and has become inadequate to meet the town's requirements.

During the year 1914 the installation of an electrically driven pump of large capacity was completed, and the new unit placed in commission recently. The new pumping equipment comprises a 12 by 14-inch Gould vertical triplex, double-acting pump, direct-connected to a 150-horsepower, 4,000-volt, three-phase, 60-cycle

induction motor, also a small air motor-driven pump used to remove the air impounded in the suction chambers of the main pump. When operated at 38 revolutions per minute, the main pump is rated at 1,500 gallons per minute at pressures not exceeding 135 pounds, equivalent to a static head of 310 feet, but as installed it is geared to run at 29 revolutions per minute, with a resulting capacity of 1,100 gallons per minute. In regular service, three pumps operate against a static head of 260 feet, this including a suction head of 11 feet under average conditions.

In deciding to use electric service of the Boston Edison Company for pumping purposes, the engineers of the town recognized the economies which could be effected through the use of this type of equipment.

Under present conditions the new pump is capable of pumping the entire daily requirements of the town in a period of approximately seven hours; whereas the steam unit previously required from 16 to 17 hours to perform similar service. It is, therefore, possible to confine all pumping operations to the hours of the day which do not coincide with the peak load of the lighting systems, thus securing to the town the lowest possible rate for this particular service.

It may be added that, in addition to the favorable effect produced on the rate paid for energy, the more economical operating conditions developed by the use of the electric pumping equipment will be reflected in a substantial saving in labor and materials ordinarily required for the maintenance and operation of a steam pumping plant.

At the present time, the substation controlling the electrical distribution system of the town is being remodeled to increase its capacity. These changes include the installation of a high-tension transforming equipment, to enable the town to receive its service from the 13,200-volt system, instead of from the 4,000-volt system heretofore employed in supplying the town's service from the Newton substation. With the completion of this work, the pumping station will be operated from a separate feeder from the substation entirely distinct from the other business of the town, thus eliminating any disturbance in the lighting service which might be caused by starting a motor of such large capacity as that employed in connection with the main pump.

New-Business Gains Made by Byllesby Properties.

All Byllesby electric properties for the week ending July 3 showed net connected load gains of 283 customers with 292 kilowatts lighting load and a temporary loss of 852 horsepower in motors. New business contracted for included 849 customers with 1,040 kilowatts lighting load and 3,635 horsepower in motors. Of the power business secured, 2,666 horsepower was at St. Paul where contract was entered into during the week by the Great Northern Railway with the Consumers Power Company, covering power for round house and shops. Output of the properties for the week was 7,645,066 kilowatt-hours, an increase of 10.9 per cent over corresponding week of last year.

The Minneapolis General Electric Company during the week secured contracts for 330 customers with 385 kilowatts lighting load and 87 horsepower in motors and took orders for wiring 28 already built houses. The Louisville Gas & Electric Company during the week secured contracts for 110 electric customers with 88 kilowatts lighting load and 53 horsepower in motors and took orders for wiring 44 already built houses. During the week of July 4, three power contracts were secured amounting to 61 horsepower, making a total of 118 contracts secured this year to date, amounting to 2,635 horsepower.

Improvement for Manchester Street Lighting.

A committee of the city government of Manchester, N. H., has been studying the street-lighting systems of Lowell, Lawrence, Haverhill and Salem, Mass., with a view to recommending changes in the public lighting of their city. It is proposed to substitute large incandescent units or magnetite arc lamps, like those installed in Lynn and Lowell, for the prevailing arches of small incandescent lamps which are used on the main business streets of Manchester.

Large Sign in Johnstown.

The Fort Stanwix Hotel of Johnstown, Pa., is now the bearer of one of the largest electric signs in that city. The new hostelry was completed recently and the contract for the sign was given to George J. Griffith & Company of Johnstown. The sign contains the name of "Fort Stanwix Hotel" and is 17 feet 6 inches from the top of the roof and 26 feet long. The letters are three feet high. The sign can be seen at all angles and for miles around the city.

The Jumbo Electric Iron as Feature of Parade.

A clever way of boosting central-station service, and advertising electric heating appliances, while aiding in success of a local celebration, has been demonstrated by the Wilmington & Philadelphia Traction Company, of Wilmington, Del.

The occasion was an "Old Home Week," among the special features of which was an industrial pageant. At about the same time the company was making a special campaign on Westinghouse electric irons. This gave A. W. Burke, superintendent of the Light, Power and Telephone Departments, the idea of building a float to represent a large electric iron. It was mounted on the chassis of a small electric runabout, ordinarily used by one of the company's trouble men.

The Wilmington & Philadelphia Traction Company had three floats in the parade, of which the monster electric iron attracted the most attention on account of its unusual appearance. This float was the subject of a great deal of favorable comment, and the company received a number of compliments from city officials as well as from the committee in charge of the parade, for the originality shown. The pageant was witnessed by a crowd of 30,000 and while no figures are available to show the number of sales resulting directly from this display, the company is confident that the expense was more than justified.

Operating Statistics, Pacific Power & Light Company.

The Pacific Power & Light Company, Portland, Ore., operating in various Oregon and southern Washington cities, has issued a comprehensive summary covering comparative statistics of electric operation at its different points of service during 1914. These statistics, setting forth important and individual features relating to distribution costs and earnings, are tabulated in the accompanying table, and are of particular interest with regard to operating and service cost to the individual consumer in that section of the country, with contingent revenue and profits, as will be noted:

Station	Population Per Customer	Gross Earnings Per Customer	Earnings Per Capita	Cost Distribution Mills Per Kilowatt-Hour Sold	Cost Distribution Per Customer	Commercial Exp. Per Customer	New Business Per Customer, Gained	Operating Ratio, Per Cent
Walla Walla	7.4	$60.10	$ 7.72	0.83	$1.80	$4.02	$13.30	26
North Yakima	5.0	59.60	11.50	1.46	2.60	3.11	16.50	25
Pasco	4.6	95.03	19.85	0.65	3.65	6.92	25.62	33
Prosser	6.0	49.00	8.30	0.42	1.17	6.72	180.00	40
Pendleton	4.0	55.40	13.34	2.37	3.17	2.98	11.43	25
Sunnyside	4.2	40.80	9.01	3.47	2.87	3.97	12.77	31
Dayton	4.8	34.65	7.10	4.35	2.28	4.07	14.74	28
Toppenish	4.4	50.80	12.13	1.62	2.44	4.79	16.20	31
Pomeroy	4.9	43.90	8.75	5.30	3.31	5.37	16.91	43
The Dalles	5.2	62.00	11.60	1.43	2.97	5.04	19.86	27
White Salmon	6.0	31.90	5.20	4.82	2.11	6.50	28.60	62
Goldendale	5.4	32.70	5.91	4.76	2.17	3.85	8.22	42
Astoria	5.2	61.30	11.11	1.36	2.32	4.30	6.40	36
Average	5.3	$58.20	$10.50	1.29	$2.52	$4.30	$17.76	40

Electric Sign Diverts Trade.

An interesting instance of co-operative use by a group of retail merchants of electrical advertising is to be found in Louisville, Ky., where the Market Street Improvement Association is collectively spending about $12,000 a year in this manner. This is only a portion of the electrical advertising used by the retailers on that thoroughfare, who, individually, in the aggregate, probably equal the amount paid by the association as a whole. Market Street in Louisville is generally known as the popular-price retail section, compared with the Fourth Street section, although there are a number of retail establishments on Market that will compare with any on Fourth Street. But the Market Street retailers are organized and working as a unit to divert trade to their stores.

Recently mention was made in these columns that this association had invaded the Fourth Street retail district by buying space on the Federal Sign System, co-operative sign board on Fourth Street. A sign reading, "It Pays to Buy on Market Street," was installed as a trial. The results were satisfactory to the Market Street merchants and they have now contracted with the sign company for an elaborate flashing sign on the same board.

In both the upper corners of the sign, on colored ground, the insignia of the association will be displayed, the dollar with the dollar mark and slogan, "It Pays to Buy on Market Street." In the center of the sign is a large figure designed to give the impression of a rocket bursting, the lamps and the ground being outlined in various colors and the falling sparks to be indicated in the course of the descending lines of lamps.

The contract with the sign system is for one year's service and maintenance. The service will cost the Market Street Association $1,800 and the contract provides for the sign to burn an average of 200 hours each month, depending upon the time of year. The whole is 20 by 30 feet. There are approximately 350 eight-candlepower Mazda 10-watt lamps in the piece. The letters are each 24 inches high.

Electric Guide Post at Biddeford, Maine.

The Maine city of Biddeford, in order to insure travelers by automobile coming through the main business center, has erected a signboard 22 feet in height and containing 152 incandescent lamps forming the words "To Portland," at the corner of Elm and Main Streets, where travelers to Maine resorts pass in large numbers during the summer. The cost of $250 was borne by popular subscription.

SUCCESSFUL COMMERCIAL MANAGERS.

T. I. Jones.

While there has been and perhaps always will be considerable discussion on the question of the engineer versus the salesman for central-station commercial work, all are agreed that an engineer with real sales ability meets the requirements in an admirable manner.

Theodore Inslee Jones, general sales agent of the Edison Electric Illuminating Company of Brooklyn, is an electrical engineer, graduated from the Massachusetts Institute of Technology with the degree of Bachelor of Science in the Department of Electrical

T. I. Jones,
General Sales Agent, Brooklyn Edison Company.

Engineering. Soon after graduation he entered the telephone field in the New York office of the American Telephone & Telegraph Company, being identified with the inspection and executive departments of the company. From there, he took up local telephone work in the executive and traffic departments of the then New York & New Jersey Telephone Company, in its New Jersey division.

Leaving the telephone field the early part of 1907, Mr. Jones accepted position as illuminating engineer with the Nernst Lamp Company of the Westinghouse interests in New York, and while in this position was called upon to organize the sales department of the United Electric Light & Power Company of New York, becoming its first sales manager.

After two years' work with the United Company, he was invited to take charge of the sales activities of the Edison Electric Illuminating Company of Brooklyn, which position he accepted in September, 1909. He reorganized the sales department, including from that time the advertising and old-building wiring departments, which had until then been conducted separately from the selling organization.

During the past five years the annual gross earnings of the Brooklyn Edison Company have increased from $3,700,000 in 1909 to over $6,244,000 for the year 1914.

Since the reorganization of the sales department of the Brooklyn Edison Company in 1909, a showroom, called the Brooklyn Edison Shop, has been opened at the main offices in Pearl Street and three new branch offices established for the transaction of the company's business in the South Brooklyn, Bedford and Williamsburg sections, respectively. In each of these branch offices displays of electrical appliances are made.

In connection with the appliance policy, there was adopted during the latter part of the year 1913 a "monthly special" method of featuring some particular appliance and making a "special" of it for a given month. This has been most successful.

It is well known that in Brooklyn there is a large number of unwired residences. With a view to getting some of this business, the sales department of the Brooklyn Edison Company, under Mr. Jones' direction, devised, in connection with the contractors of the borough, a flat price per outlet partial-payment residence wiring plan, which was put in force the early part of last year, and is still in successful operation.

Mr. Jones has written a number of papers which have been presented before the National Electric Light Association and the Association of Edison Illuminating Companies. Among these may be mentioned: "Functions of a Sales Department," "Development of Revenue from Existing Customers," "Canvassing by Telephone," "Selling Electricity" and "Instrumental Methods of Measuring Maximum Demand."

He was elected chairman of the Commercial Section of the National Electric Light Association, and served in such capacity during the year 1913-14. He is Past Statesman of the Jovian Order, New York District, member of the American Institute of Electrical Engineers, Illuminating Engineering Society, New York Electrical Society, Kilowatt Club and the Manufacturers' Association of New York. Also member of the Technology Club of New York, Engineers' Club of New York, Crescent Athletic Club and others.

Electrical Construction

OFFICE SYSTEM AND FORMS FOR THE ELECTRICAL CONTRACTOR.[1]

By Clovis M. Converse.

In any business each department or division of the same requires a system of handling the work, and printed forms to facilitate this operation. These printed forms are also necessary as a permanent record of all transactions. In the electrical contractor's office, taking the case in which we are interested, there are three general divisions of the business, estimating and securing the contract or order, handling and completing the work after it has been secured, and credits and collections. It is with the second division, *i. e.*, the proper handling of a contract from the time it is secured until the final bill is sent to the customers, that this paper will deal. It is not the purpose of this paper to enter into keeping of unit labor costs, although the writer believes this is necessary and advisable.

In general there are three classes of contracts which the electrical contractor will be called upon to handle:

(1) Contracts large and small at a fixed predetermined sum.

(2) Contracts on a fixed basis, *i. e.*, cost plus a given percentage or cost plus a fixed sum.

(3) Open time-and-material orders.

The same system and forms will handle any of the above if properly designed and used.

In designing a system and forms for the electrical contractors we must first take into account the results to be secured. Briefly, these are as follows:

(*a*) The work must be started and carried to completion as speedily and accurately as possible.

(*b*) An accurate record must be kept of all labor and material required to complete the work.

(*c*) The customer must be informed of the amounts due the contractor from month to month or on completion of the job.

(*d*) A complete, clear and easily accessible record must be maintained in the office of all transactions, so that same may be reviewed at any time for the satisfaction of either customer or contractor.

The order system in use by the Electric Construction Company, St. Paul, Minn., has proven very satisfactory, and seems to fulfill the foregoing requirements. A brief description of same will, therefore, be given.

When an order is secured (or comes in over the telephone) the first point considered is the credit of the customer. This having been approved, a construction order (Fig. 1) is made out, together with a labor sheet (Fig. 2). These construction orders are numbered consecutively and indexed. Each job has a separate number to which labor and materials are charged. The index mentioned above may be made as complete as seems desirable. In our office it shows the following: A list of the jobs in numerical order with the amount, an alphabetical list of customers showing the C. O. number, a list of the jobs obtained by each man during a given month. This list also shows the amount of the job, and eventually the profit on same. This work is all done by the stenographer.

Form EC 16 3M P

THE ELECTRIC CONSTRUCTION CO.

CONSTRUCTION ORDER

*Date*_____ 191__ *Issued by*_____ *No.*_____

Charge to

Location of Work *Permit No.*

Description of Work

Additional Work

Work Done by *Date Finished*

Correct

Fig. 1.—Construction Order.

The construction order is in duplicate, a white and a yellow copy, and shows the name of customer, the location of the work and has a space for a short description of the work.

For small jobs this description is written on the order; for larger work the order simply reads "as per plans and specifications" or something similar, these plans and specifications being sent to the foreman with the order.

Assuming the construction order and the labor sheet has been made out, and that complete instructions accompany them, let us follow them on their way to the general foreman. The labor sheets are filed in numerical order in a loose-leaf binder for future use, the construction order is separated, the white copy or original, going to the man who is to do the work, the yellow or duplicate copy being retained by the general foreman, who notes on same the man or men assigned to the work. (It is to be noted that the man who carries the construction order on a job is in charge of and responsible for same.)

Form 17

ELECTRIC CONSTRUCTION CO.

Closed By — Charge to — C. O. No.

Contract Price — Address — Date Ordered

Work to be done — Credit Approved

Order No.

Date Billed

Contract

Profit / Loss — Labor for Month of _____ 191__ — Time & Mat'l

Name — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 — Total Hours — Rate — Total

Fig. 2.—Labor Sheet.

1 Paper presented at meeting of Minnesota Electrical Contractors' Association.

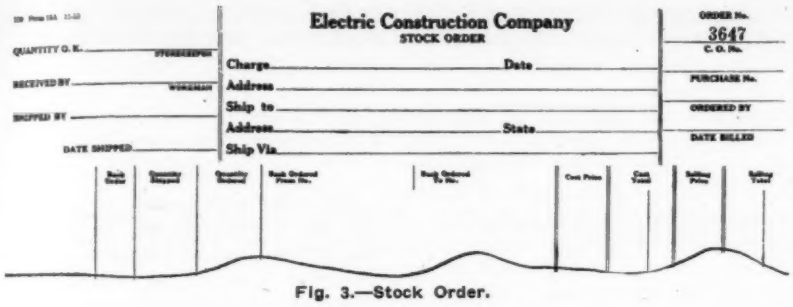


Fig. 3.—Stock Order.

The next item in the progress of the order is the getting out of material for the job. Two forms are used for this purpose; one for the recording of material taken from stock, and one for the ordering of material from others. Fig. 3 is the form for the stock order, and the form for ordering outside materials is very similar. These forms all bear consecutive numbers for purposes of identifications. These orders may be made out by any one, but are checked by the foreman and filled only by the stockman. All outside orders should be countersigned by the foreman. In general, on small orders, the material is ordered by the man who is to do the work; on larger orders the material is ordered by the foreman from the estimate sheet on file in the office. All special material requiring detailed information is ordered by the office, as is all material for out-of-town work.

In our system these two forms are identical, except that one is marked "stock order" and only one copy is made, while there are four copies of the outside order. These order forms, together with the credit sheet (Fig. 4) and the labor sheet before mentioned, form the backbone of our entire record system; in fact, they are our permanent files. Let us, therefore, look them over in detail.

Take the case of a small time-and-material job as typical. The man receives his construction order, orders his material, and it is written up on the stock order, the man being called on to furnish the name of the customer and the C. O. number. This order is then filled by the stockman from his stock, the exact amounts furnished being placed in the "Quantity Shipped" column. Any material which is not in stock is back-ordered and an outside order made out. (In our case all orders go to the Northwestern Electric Equipment Company, so that in some ways our system is special, but it could easily be modified slightly to suit other contractors.)

As before stated, there are four copies of this outside order. These are used as follows: The first copy or original, is retained and later filed in numerical order under the job number, as is also the stock order previously described. The second or tissue copy, and the third, or orange copy, go to the company from which material is purchased, as an order for material; the tissue copy comes back with the material ordered, the third or orange copy, being retained by the sellers for their records; the fourth, or yellow copy, is filed in numerical order, and is used as a file for invoices when they are received, and as a means of identifying them.

When the man has completed the job he brings in the unused material, obtains a credit slip from the stockman, and writes the customer's name and the C. O. number on the slip, placing same with material. The stockman then goes over this material, returns it to stock and enters the amounts on the credit slip.

Taking the procedure outlined as typical, let us see what happens to these material charges which are collecting on the stockkeeper's desk.

At the end of each day they go to the foreman who looks them over. To be sure that these slips are not lost after leaving his hands, the foreman notes on the yellow copy of the construction order the order number of each as he checks them. From the foreman these charge tickets, as they are now called, go to the bookkeeper.

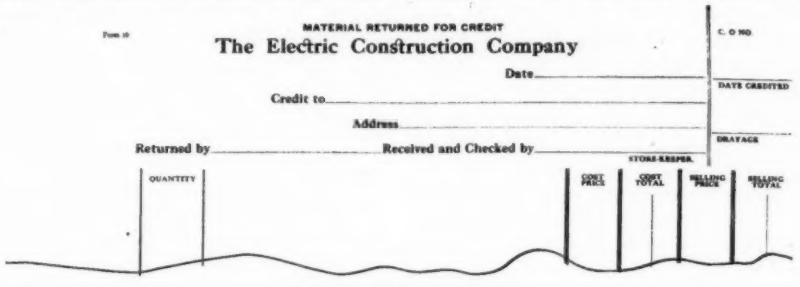


Fig. 4.—Credit Sheet.

Coming back for a moment to our man who has been doing the work; at the end of each day he makes out a time slip (Fig. 5) which he turns in. This time slip shows the time he has put in for the day and to what construction order number it is to be charged. These time slips go to the foreman, who approves them; the amount of time is then entered on the labor sheets and on the pay-roll book. These two entries are necessary to provide for charging the time to the customer and of recording same for the purpose of payment. If a job has been completed, the wireman notes this fact on the construction order and turns it in with his time slip. When the foreman receives this construction order he signs and sends the yellow or duplicate construction order through to the bookkeeper together with the labor sheet.

Once a day all material charges, credits, complete construction orders, labor sheets, and time slips are turned over to the bookkeeper, the time slips to be approved by the manager and filed, the material charges and credit tickets to be priced and filed in the

The Electric Construction Co.
ST. PAUL, MINNESOTA
TIME SLIP

Workman's No. _____ Name _____ Date _____

STARTED	QUIT	C. O. No.	No. Hours	Car Fare	CHARGE TO	DESCRIPTION OF WORK
7 15 30 45	7 15 30 45					
8 15 30 45	8 15 30 45					
9 15 30 45	9 15 30 45					
10 15 30 45	10 15 30 45					
11 15 30 45	11 15 30 45					
12 15 30 45	12 15 30 45					
1 15 30 45	1 15 30 45					
2 15 30 45	2 15 30 45					
3 15 30 45	3 15 30 45					
4 15 30 45	4 15 30 45					
5 15 30 45	5 15 30 45					
6 15 30 45	6 15 30 45					

Correct

Total Hours _____ Approved for Payment _____ Foreman _____

Fig. 5.—Time Slip.

current binder, and the construction orders to be put through for billing.

The latter consists of the following operation; when the completed C. O. is received by the bookkeeper, his first move is to withdraw all tickets of that number from the current binder, these tickets are then checked back against the numbers on the C. O. to show that none is missing. Next, all tickets not already priced are priced, extended and totalled, such prices (for stock material) being based on the market price, and for material purchased for that particular job on the invoice price. All material charges and credit sheets having been totalled and having deducted the credit for material returned, we have the net cost of material for the job.

The labor is computed from the labor sheet; the labor and material charges being added, we have the net cost of the job. These figures for convenience are summarized on the labor sheet.

In pricing a time-and-material job, both sets of prices are put on the charge ticket, *i. e.*, the cost and selling price. In this case the totals of these tickets would show the total cost and total selling price. On a contract job or on a percentage job the selling prices are of course not used. When this stage has been reached the job is ready for billing, except that all the extensions and additions are first checked by means of a comptometer.

For a contract job the form of bill or invoice used carries a simple statement of the kind of work done, the date and amount of the contract and the extras, if any. For time-and-material jobs the labor and material are itemized, except for the very small bills. A carbon copy is kept of all invoices and these are filed in a binder in numerical order and indexed under the customer's name.

The billing being completed, the invoices go to the bookkeeper to be entered and mailed to the customer. The charge tickets and labor sheet are filed in standard binders in numerical order under the C. O. number.

On large jobs where the customer is billed every month for the labor and material installed during the previous month, the tickets are handled in much the same way, except that the construction order is not turned in and a new labor sheet must be made out to replace the one turned in; also, credit is not given for material returned until the job is completed.

We believe our system as outlined obtains the desired results as given previously with the minimum of labor and maximum accuracy.

First, the construction order carries a complete description of the job giving the foreman the opportunity to handle it to the best advantage; second, the material charges and labor sheet previously described give us a simple, accurate record of all time and material entering into a job. The chance of error in these charges and also a lot of labor is eliminated by the fact that there is no transferring or copying of quantities of material, the original order or ticket forming the final permanent record. Third, our system of billing gives all the information necessary and automatically records same; fourth, by filing all tickets in numerical order in binders we can at any time refer to same and find a complete detailed record of the job showing just how, when, where and by whom the work was secured, completed and billed.

Important Committees of Electrical Clearing House.

The Louisville Electrical Clearing House, Louisville, Ky., has ordered appointment of two new committees. The first, which will be named by C. C. Childers, president of the association which is composed of the electrical contractors of the city, will take up with the Louisville Gas & Electric Company the proposition of special inspections of buildings when vacated by one tenant and before occupied by another. Such inspections, it is pointed out, would mean a lot of money to the contractors by reason of the fact that one tenant is often guilty of stringing wires on his own account, without regard to the building restrictions, and that any inspector would order them torn out. Deteriorating installations, also, could be detected and replaced. The contractors admittedly are prompted by primarily selfish motives, though they justify their attitude by the statement that improper wiring by amateurs is very likely to cause fires and loss of property.

The other committee is regarded as an extremely important one and will combine the duties of a grievance committee and an arbitration board. The intention is to select its five members from among the top-notchers in the trade in the city, including experts on motor installations, conduit work, house wiring, etc. It is the idea that such a committee could take up disputes between contractors who contend their work is up to specifications and the Code and inspectors of opposite persuasion, and determine from the facts in the case which party is in the right. Such deadlocks have proven expensive at times to contractors who felt that they were being imposed on by inspectors. Eventually, it is believed that the same committee may be able to take up and settle other issues, such as character of materials, manner of work, price, labor trouble, etc.

Contractors Promote Installation of Exhaust Fans.

Electrical contractors of Louisville, Ky., are paying a good deal of attention at this time to installations of exhaust-fan systems of ventilation in buildings which were constructed as theaters, etc., before this system came into more or less general use. There are numerous such buildings in old towns like Louisville—restaurants, factories, motion-picture theaters, etc. The argument is that in any large room or place where odor and moisture-producing processes are carried on and in which provision is not made for disposing of the dead air inside, the ordinary types of fans will not prove completely satisfactory. Unless exhaust fans are provided for removing the old air, it soon becomes saturated with moisture and the action of the electric fans within the room does not create the sensation of coolness. The result has been that the desk and ceiling-fan equipments of numerous small manufacturing establishments, restaurants, theaters and even some homes, have been supplemented by exhaust fans. In homes, however, the kitchens are, of course, getting most of this attention.

Pennsylvania Officers Elected.

At the meeting of the Electrical Contractors' Association of Pennsylvania, held in June, the following officers were elected:

President: John S. Musser, Harrisburg.

Vice-president: W. T. Brown, Philadelphia.

Secretary-treasurer: M. G. Sellers, Philadelphia.

Board of directors: George E. Shepherd, Wilkes-Barre; M. E. Arnold, Philadelphia.

National director: George E. Shepherd, Wilkes-Barre.

Building Operations in the United States.

The official building permits issued by leading American cities for the first six months of 1915, as compiled by the *American Contractor*, totaled $318,179,519, a decrease of $32,684,347, or only nine per cent, as compared with the same period in 1914. With the building projects in sight and the optimistic tendency that views enlarged activities in the near future, it is not improbable that the deficit in this half-yearly showing may be more than made up during the balance of this year.

Public Service Commissions

Conducted by William J. Norton

KANSAS.

Kansas Natural Gas Company. The Commission has issued an opinion justifying an increase in gas rates to consumers supplied by the Kansas Natural Gas Company from 25 cents to 28 cents per 1,000 cubic feet It is stated, however, that no increase will be ordered until the Missouri Commission provides for a similar increase in Missouri.

MASSACHUSETTS.

Newton and Watertown Gaslight Company. The Board of Gas and Electric Light Commissioners has reduced the rate of the Newton and Watertown Gaslight Company for gas service in Newton, Waltham, Watertown, Wellesley and Weston from 90 cents to 85 cents, effective August 1. The Board finds the new price will yield a fair return on the capital invested, and points out that since the last reduction was made the business of the company has increased about forty per cent and the price of gas oil has decreased.

New England Telephone Company. Under the provisions of an order issued July 14, by the Public Service Commission, the New England Telephone Company is required to install a meter for measured telephone service when the subscriber calls for it. The price to the subscriber is to be $1.50 a year, which is just half of what the company has been charging for it in the past.

MISSOURI.

Springfield Rate Case. The District Court of the United States, Southern Division of the Western District of Missouri, has granted a temporary injunction restraining the enforcement of the order of the Missouri Public Service Commission, which fixed the valuation of the Springfield Gas and Electric Company and established rates for electric service in Springfield, Mo.

The progress of this case will be followed with great interest, as its final disposition will afford the first ruling of a court in an electric rate proceeding upon appeal from an order of a public service commission, so far as known.

The decision of the Commission, rendered June 23, 1914, reduced the company's maximum rate from 15 cents to 8 cents per kilowatt-hour. (This decision was abstracted in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, July 11, 1914, page 83.) From this decision the company appealed to the Court. The company offered, in place of the old 15-cent rate for residence lighting, to install rates not in excess of 10 cents per kilowatt-hour, and the temporary injunction was granted upon that condition.

The injunction is granted because it is impracticable, in the opinion of the Court, to determine from the Commission's figures the reasonableness of the final valuation allowed.

The Court says: "The opinion and order of the Commission discloses that it took the lowest of the computations, made by three several engineers, of the cost of reproduction new of the property involved, less depreciation, made substantial reduction thereon, and therefrom deducted an actual cost of reproduction, less depreciation, of $200,126. The fixed valuation of $300,000 was arrived at by the addition thereto of $100,000, because of 'considering said plant as a going concern and taking into account the fact that said plant is in successful operation, and including engineering, supervision and interest during construction, organization and general expenses, legal expenses, contingencies, insurance, general contractor's profit, promotion and other development expenses, working capital, and including all other elements of value, tangible and intangible, as used in the public service in supplying electric energy at Springfield.' It is contended by complainant that this allowance for the various items thus recited is unreasonably low to the point of confiscation. The Commission has made an omnibus allowance without itemization in findings, opinion or order. Hence it is impossible to test the reasonableness of its findings without such a comprehensive examination of the entire case as is impracticable upon a preliminary hearing of this nature." * * *

Development Rates.—"Counsel for defendants sought to justify the order of the Commission in this case upon the ground that a like rate is in force at Joplin, Mo., a city of almost the same population. Complainant asserts that the nature of the industries and business conditions at Joplin operate to produce a materially greater net return at Joplin than at Springfield. To this the defendants reply that the establishment of an identical rate at Springfield would tend to build up a profitable patronage at the place to such an extent as to equalize industrial conditions in the two cities; but such a result must necessarily be theoretical and speculative. Commission action based upon such considerations invades the right to control and management incidental to ownership. In *Northern Pacific Railway Company and Minneapolis, St. Paul & Sault Ste. Marie Railway Company v. State of North Dakota, ex rel. T. F. McCue, Attorney General,* the Supreme Court of the United States has said that it is beyond the power of the State to compel the establishment and maintenance of rates not otherwise reasonable in order to build up a local enterprise."

Valuation Required by Commission Law.—"It is apparent that if the contentions of complainant be sustained, in any substantial degree, the return upon its investment would fall short of a fair and reasonable return at the rate fixed by the Commission itself. It further appears that such claims demand serious consideration. The Court has been embarrassed, in its review, by the form of the decision and findings which enumerate in general terms the items included, but fail to specify the amount allowed for each." * * *

The Court cites Subsection 2 of Section 78 of the Public Service Commission Act requiring the Commission to "make and file its findings of fact in writing upon all matters * * * bearing on the value of the property" of the corporations affected, and the Court says: "It may be doubted whether a decision and findings which state nothing but the total valuation fixed by the Commission, without showing the amount allowed for each item included, would be a compliance with the manifest purpose of the law to permit the parties interested to test in court the questions involved. Under such circumstances, what is the duty of the court upon temporary hearing? In *Newton v. Lewis,* 79 Fed. 715, the Court of Appeals announced the rule which prevails in this circuit.

Duty of the Court.—" 'When the questions to be ultimately decided are seri-

ous and doubtful, the legal discretion of the judge in granting the writ should be influenced largely by the consideration that the injury to the moving party will be certain, great and irreparable, if the motion is denied, while the inconvenience and loss to the opposing party will be inconsiderable, and may well be indemnified by a proper bond, if the injunction is granted. A preliminary injunction maintaining the *status quo* may properly issue whenever the questions of law or fact to be ultimately determined in a suit are grave and difficult, and injury to the moving party will be immediate, certain and great, if it is denied, while the loss or inconvenience to the opposing party will be comparatively small and insignificant if it is granted.'

"Counsel for defendants in their brief point out that, if its contention is sustained, complainant will seek to recover its losses by making charges against consumers in excess of the rates then in force. They say:

"'After a final hearing, and these rates declared illegal, the complainant will be admirably situated to make such collections. Having a monopoly of the business and power to discontinue the service at will, complainant has the whip hand and requires no aid from court to maintain its rights.'

"A sufficient answer to this argument is found in the fact that consumers of electricity are constantly changing, and that additional charges could scarcely be enforced against those who had not enjoyed the lower rate. Moreover, the powers of complainant are not so absolute as this suggestion of counsel would imply. It would, in most cases, be put to its recovery at law, and this would involve a multiplicity of suits.

Irreparable Injury to the Company.—"On the other hand, the injury to the moving party in this case will be certain, great and irreparable if its motion be denied and its contentions ultimately sustained, while the inconvenience and loss to each consumer will be inconsiderable and may well be indemnified by a proper bond. A course of business that will insure a prompt refund of charges ultimately adjudged to be excessive may easily be prescribed in a case like this." * * *

The order provided that a record be kept by the complainant, and "such evidence of consumption and payment issued to the consumer that any excess due the latter may be readily computed and judicially determined. A bond in sufficient amount and with appropriate conditions will be exacted to insure compliance with the order made, and jurisdiction will be reserved in this Court to adjudicate all claims which may be found to accrue from the granting of the temporary injunction."

NEW JERSEY.

The Farmingdale Lighting Company has been forbidden to favor officials and employees in rates for service. The Board found that upon the rates for service supplied by this company to its customers, widely different rates of discount were allowed. The officers and certain employees of the company were granted a discount of 25 per cent and the linemen received a discount of over 66 per cent, if their bills were paid within the required time. The company sought to justify this unusual discrimination in favor of its officers upon the ground that they received no salary or other compensation, but the Utility Board found that that was not a valid reason.

The opinion says: "It has been repeatedly held that a director, stockholder or employee of a utility company is entitled to no preference or advantage in the matter of the rate he is to pay for service. The only exceptions are those expressly made by statute. They should all be charged the regular rate. Matters of salaries and wages should be treated on a more business-like basis than discrimination in rates for service. The public utility act of this State provides that no public utility shall make any unjustly discriminatory or unduly preferential rate, charge or schedule for any service supplied or rendered by it; or make or give, directly or indirectly, any undue or unreasonable preference or advantage to any person or corporation. Under the prohibitions just referred to, the practice of allowing directors, officers or employees different rates of discount than are allowed to other purchasers of electric current is illegal."

The company is ordered to discontinue such discrimination.

NEW YORK.

Perpetual or Indeterminate Franchises. The Constitutional Convention Comittee on Legislative Powers has appointed a sub-committee to draft an amendment to the Constitution which will prevent the granting of perpetual franchises to public utilities in the future.

An amendment is before this committee prohibiting the Legislature or any municipal authority from granting a franchise in perpetuity and providing that indeterminate franchises may be granted without limit of time upon conditions that permit the granting power to resume control of the franchise upon terms to be embodied in the original grant.

NEW YORK—Second District.

Ulster & Delaware Railroad. The company's application for a rehearing of the recent order of the Commission, denying the Ulster & Delaware Railroad Company permission to raise its mileage rate above the two-cent maximum set by the Legislature (see last week's issue of ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, page 121) has been formally denied by the Commission.

In the order denying the rehearing it is made clear that the Commission refused the proposed increase only on the ground that it did not have the power to grant it. The decision says:

"While the Commission is of the opinion that the rate complained of is insufficient to yield reasonable compensation for the service rendered, yet the Commission, as set forth in its order of July 6, 1915, is of the opinion that it has no jurisdiction to grant the increase."

The question of jurisdiction, involving an authoritative determination as to whether the Legislature of 1907 gave the Commission all power over rates irrespective of the acts of the Legislature in setting maximums, may now, therefore, be presented to the courts. It is not unlikely that in the meantime either the Constitutional Convention or the Legislature may define these powers of the Commission anew so as to remove all future doubt of their scope.

Empire Gas and Electric Company. The Commission has consented to the merger of the Weedsport Electric Light Company with the Empire Gas and Electric Company. Within thirty days of the merger the company is to report all the details to the Commission for approval.

The Western New York Electric Company has been authoritzed to begin business under the terms of its franchise in the town of Ellicott, Chatauqua County. The franchise is for parts of the town not supplied by the Jamestown Lighting and Power Company.

New York Telephone Company. The Commission has settled the complaint of Frank M. Bradley, individually and as representing the West Somerset Cold Storage Company, against the New York Telephone Company, as to its service and charges to the Barker exchange. The order provides for four-party service in place of the present multi-party service at a base-rate area charge of $21 for business and $15 for residence service, plus a mileage charge of $2 per square mile beyond the base-rate area. The mileage charge was opposed by the complainant, but the Commission finds that this charge is in state-wide use by the company, and that a change in this charge would involve an extended inquiry into the reasonableness of the charge throughout the state. The company is ordered to

put into effect the four-party line service at the above rate on August 1, and is authorized to collect the mileage charge pending the determination of the Commission as to its reasonableness.

PENNSYLVANIA.

The **First Annual Report** of the Public Service Commission has been issued in bound form. The cases handled by the Railroad Commission, subsequent to the last report issued by that Commission, are reported, and the work of the Public Service Commission, beginning July 26, 1913, to June 30, 1914.

Competition.—In discussing the work of the Commission upon the applications for certificates of convenience and necessity, the report says: "One case in which the certificate was refused, attracted more attention than all of the others, and it was almost at once followed by an effort upon the part of the officers of some of the smaller municipalities throughout the State to have this part of the act modified. The case was one where it was proposed to burden a minor municipality with two sets of poles and wires for furnishing light, heat and power. It is the evident intention of the act, as it exists, that excess of rates and imperfection of service shall be remedied, not by attempted competition, accompanied by duplication of expense, as formerly, but by the exercise by the Commission of the control and authority vested in it over the corporation supplying the service. This is a new method in Pennsylvania, though long in use elsewhere, to which her people have not yet grown entirely accustomed. It is altogether probable that when they learn by experience that there is a tribunal to which they may apply in their differences with the public service companies, and that the installation of competing companies with the duplication of unsafe and unsightly poles and wires affords only uncertain and temporary relief, they will be more satisfied with this provision of the act. Its repeal would, however, relieve the Commission from many burdens and, in the view of the Commission, it is a matter to be determined by the wisdom of the Legislature, having regard to the best interests of the people.

"The Commission has, by rule, required that previous to the consideration of these contracts, notice of the application shall be given by advertisement in the newspapers of the locality. This order has resulted in giving individual citizens the opportunity to be heard and to have their interests considered and respected, which otherwise would have been disregarded or only established after tedious and sometimes expensive litigation."

The report also says that, "The contracts which were examined exhibited a great lack of uniformity with respect to terms, rates and the services to be rendered in different municipalities, and oftentimes a want of proper and necessary provisions. The Commission is making a thorough study of all the classes of public service companies, with the purpose of securing as nearly as may be practicable such uniformity in connection with municipal contracts."

WEST VIRGINIA.

The Manufacturers' Light and Heat Company. The Comission has dismissed the petition of the city of Follansbee against the Manufacturers Light and Heat Company. The petition asked that the company be compelled to lay its mains in the alleys and be prohibited from tearing up the paved streets to lay its mains. The Commission holds that the company has the right to lay its mains in the streets.

Electrical Trade in South America.

First-hand information on business conditions and methods of trade in South America, based on a six-months' close study of conditions there, was presented to New England manufacturers by S. S. Brill, special agent of the United States Bureau of Foreign and Domestic Commerce, at the Boston Chamber of Commerce, July 13. Mr. Brill was for ten years engaged in selling American goods in Latin America. During his recent trip he visited 35 cities in Argentine, Chile, Brazil, Peru, Uruguay and Paraguay, interviewing merchants and dealers. He reported a growing demand for electrical goods, hardware and allied products, and dispelled the prevalent impression that the trade demanded goods of distinctive styles and patterns. He insisted that, except for the modifications demanded by the climatic conditions, American goods are welcome, in design and construction identical with those designed for home sale. There need be no marked departure from methods employed in domestic trade, either. Credits are not the *bete noir* that they are thought to be, the usual terms for goods of the character mentioned being 120 days from date of bill-of-lading. This means only about 60 days between date of receipt of goods and remittance, since about two months are consumed in forwarding goods and in receiving remittance by mail.

Contrary to prevalent ideas, South American merchants are generally reliable and scrupulous. Despite *moratoria* and crises in governmental finances, there have been few failures of good houses. Those in the Argentine were in large part due to the collapse of a bank which had been involved in the handling of boom lands at fictitious prices.

Some definite practical points were offered which will be of value to shippers of electrical goods. Salesmen in South America make it the rule to obtain *signed* orders. These are good at the bank, with shipping documents or drafts attached, for about 90 per cent of face value. Import duties are based on weight and not on cost and vary with the different component parts of the same apparatus. Hence it is often desirable to pack parts separately, as the rate on the highest-valued part would otherwise be levied on the whole. Each package should be strongly packed and correctly marked with its weight in the metric system. If goods are to be lightered at port of entry, they should be wrapped in waterproof paper. Shipping documents should go by the same steamer with the goods so as to be presented at the custom house promptly, a penalty of 10 to 50 per cent being imposed for failure to present documents within three to five days.

Mr. Brill said the people of Brazil, Argentine and other countries where American branch banks are being established are beginning to see that the United States merchants are in earnest. He held that now is the opportune time to lay foundations of trade.

Philippine Hydroelectric Project.

A hydroelectric project involving about $2,000,000, for the development of which a company composed of American and Spanish capitalists has been formed, contemplates the building of a large power plant in the mountains of Tayabas near the Pacific coast of Luzon in the Philippine Islands.

An application for the water rights on the Agos River immediately below the confluence of the Lanata and Canan Rivers has been filed with the Government. The Agos River flows from the Tayabas Mountains on the eastern slope into the Pacific Ocean near the Puerta Real de Lampan.

The proposed construction for the plant will consist of a reinforced concrete dam 328 feet in length, 13 feet in thickness at the summit, and 29.5 feet in thickness at the base. From this dam the water will be conducted in an open canal two miles to a point on the hillside, where a large reservoir will be excavated in the native rock with a capacity of 530,000 cubic feet.

From this reservoir the water will be dropped through pipes six feet in diameter upon a battery of double turbines which will be directly connected with four electric generators of modern design. The plant is designed to supply power for irrigation works, mining plants, and light and power for the district lying between Manila and the generating station.

ELECTRIC WELDING.—II.

By Gordon Fox.

Incandescent Welding.

Incandescent or resistance welding depends upon the basic principle that electric current, in passing through resistance, generates heat. The process comprises essentially the inclusion of the abutted metal parts to be welded in an electric circuit of low potential. Through this circuit sufficient electric current is forced so that the resistance loss (I^2R) in the pieces to be welded causes the metal adjacent to the joint to heat. The weld is completed by the application of pressure when the metal is at welding temperature.

Incandescent welding is done in special machines which have been developed in a variety of forms for different kinds of work, but which comprise primarily:

A transformer for reducing the potential of the available alternating current from circuit voltage, 110, 220 or 440 volts, as the case may be, down to 3 to 10 volts, as required.

Means for switching on and off the welding current and for controlling it

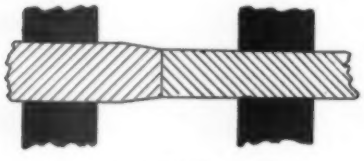


Fig. 5.

by changing the secondary potential. Since the secondary currents are very heavy it is most feasible to vary the secondary voltage by changing the arrangement or number of turns of the primary coils, using some sort of switching device, or by the use of an induction regulator or choke coil in the primary circuit.

Clamping blocks for holding the pieces to be welded and for introducing the heavy currents into them.

Mechanical means for applying pressure to complete the weld. Hand levers, foot levers, motor and hydraulic power are used in different types of machines.

The simplest application of incandescent welding is found in the butt welding of iron bars of like section. Two bars to be welded are gripped between large copper clamps at points near the ends to be joined. These clamps are made heavy in order to carry thousands of amperes without overheating. The currents used for welding sometimes run as high as 50,000 amperes. The clamps must have good and ample contact with the weld bars in order to prevent undue heat by contact resistance at the clamping point. They are often water-cooled in order to dissipate the heat which is conveyed back into them from the hot bars which they grip. The distance between these clamps is short. In welding one-inch round iron the clamps would be about 1.5 inches apart. The heating is thus confined to a very short portion of the weld pieces. The heat is caused by resistance losses not primarily due to the contact resistance of the joint but mostly due to the internal resistance of

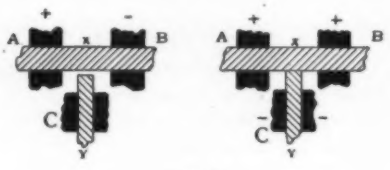


Fig. 6.

the metal of the weld pieces themselves. Obviously, the longer the circuit between clamps the greater the resistance and the more the total heating effect of a given current. The chilling power of the clamp blocks cools the weld bars under these blocks and for a short distance out from them. The temperature is therefore a maximum at a point about midway between blocks, provided both weld bars and clamps are identical. If the distance between clamps is short, the joint at the center will be at welding heat while points but a short distance away are cool. The point of maximum temperature is thus very closely confined. Too short a distance between clamps causes too great dissipation of heat back through the clamps; too long a distance prevents confining the heat to the joint.

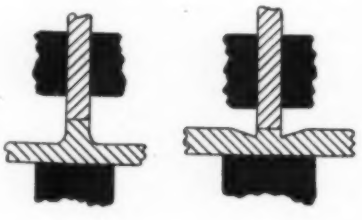


Fig. 7. Fig. 8.

The greater the distance from the

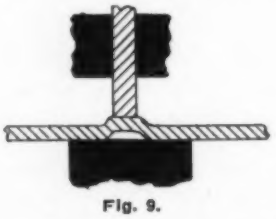


Fig. 9.

clamp to the joint the more the heat in the part.

The smaller the section of the weld piece the greater the heat for a given current.

The greater the heat conductivity of the clamps the more their cooling effect. Copper clamps conduct heat away faster than iron clamps, for instance.

The faster the heating, meaning the higher the current-density, the more the heating is confined to the joint and adjacent metal, but the less chance the heat has to "soak" and become uniform. It is also more difficult with rapid heating to switch off the current and complete the weld at exactly the right instant.

Slow heating at low current-density leads to uniformity, but causes more heat to be lost through conduction into the clamps. Slow heating also leads to increased loss through radiation into the air.

Rectangular sections present more radiating surface than circular sections per unit of volume, hence require greater current inputs and involve greater losses.

Small sections present more radiating surface than large sections per unit of volume and therefore require more power per unit of volume.

Metals having high conductivity, such as copper or brass, require higher current densities and more rapid heating than metals of considerable resistance, such as iron.

These are some of the considerations affecting the methods of clamping,

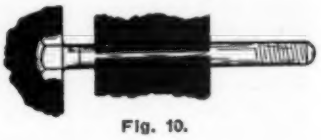


Fig. 10.

heating and applying the pressure. By suitably modifying the clamps, distances, form of sections or other details it is possible to weld together a great variety of unlike sections and different shapes.

Bars of unequal section can be welded by clamping nearer to the joint upon the small bar than upon the larger bar. The chilling effect of the clamps then keeps the small bar cool enough while the longer distance in the large bar introduces resistance and heats up the larger section equally to that of the short small section. Fig. 5 shows the method of preparing the bars and clamping them.

A few of the more common commercial welds made by the electric process might be reviewed. Straight butt-welding is used for welding bars of all sorts, tubes and wires. Rings of all sizes, eyebolts, barrel hoops, bicycle and auto wheel rims and many similar parts are made by bending straight stock into circular form and butt-welding the joint. A specialized application of this type of weld occurs in the manufacture of chain. Here the open links are butt-welded in an automatic machine.

Right-angle welds are common, as in

the manufacture of printers' chases, dashboard frames, carriage rails, bag frames, oven racks and racks of all sorts, and many other parts. An interesting application of the cross weld is the manufacture of wire fencing, where the vertical and horizontal wires are welded at their intersecting points. This work is now done automatically in special machines. Garden rakes are made by welding wrought-iron teeth perpendicularly to a backbone part. This makes a product much superior to malleable iron and at a low cost.

Right-angle welds consisting of one piece of iron welded perpendicularly to the middle of another piece, are called T welds. In most T welds it is necessary to preheat the top bar of the T to a bright red, then bring the perpendicular piece into contact and complete the weld. Fig. 6 illustrates the method. The top bar is first gripped between the blocks A and B and sufficient current is introduced to heat the piece X. When this piece is incandescent the piece Y, gripped at C, is brought into contact and the flow of current changed by a switching operation so that the current travels from C to A and B. All parts now reach welding

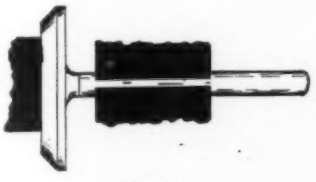


Fig. 11.

temperature and the weld is completed in the usual manner. Some experience is necessary to determine the proper clamping distances, the right amount of preheating of the T bar and other details, after which the work can be done easily and uniformly.

Bars may be welded perpendicularly to plates in several ways. It is not feasible to butt the bar directly against the plate, since the large section of the plate will not generate as much heat as is generated in the bar, but will tend to conduct it away. If a boss can be formed on the plate, the rod can be readily welded to the boss, as shown in Fig. 7. Another method is to make a recessed channel in the plate to gain the same end. Fig. 8 illustrates this method. A third method raises the metal of the plate by stamping as shown in Fig. 9. These methods are employed typically in welding heads to bolts (Fig. 10), valve stem to valve (Fig. 11), stirrup (Fig. 12), handle to sheet-metal cover (Fig. 15). A similar method is used for welding calks to horseshoes (Fig. 14). Tubes are welded to flanges in the same manner (Fig. 13).

Commercial examples of welding of special shapes occur in many forms. Automobile - engine crankshafts are made by welding several parts together. The central portions are drop forgings,

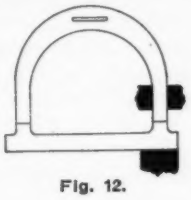


Fig. 12.

while the end portions are drawn steel shaped almost to size. The parts are welded together in the round sections, being guided and united with great accuracy. In the manufacture of table knives the blade, handle and hilt are made separately and welded together. Metal wheels for traction engines, farm machinery and wheelbarrows are made by welding the spokes both to hub and rim. Bicycle frames are assembled by welding tubing to the various

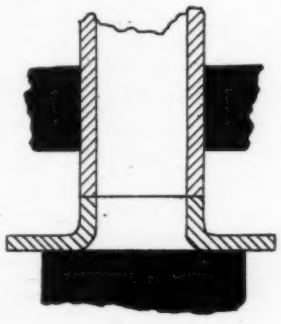


Fig. 13.

corner fittings, the electric process having replaced brazing for this purpose. Garden hoes are made by welding the round shank for the handle to the flat blade. These examples illustrate how the process had been adapted for different purposes. It is possible, by adjusting the various influencing factors, to obtain a great variety of characteristics and consequently to meet the re-

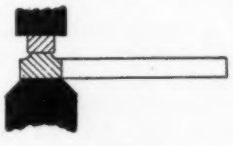


Fig. 14.

quirements of an increasing number of applications.

One development which has found considerable usage is the welding together of metals of different characteristics. For instance, in the manufacture of tools the cutting edge can be made of high-carbon steel, while the shank of the tool is made of low-carbon material. Axe blades are welded to the eye piece. Many machine tools are made advantageously in this manner. Nearly all twist drills now have forged-steel shanks welded to high-carbon-steel stems. Special clamping dies are required to secure perfect centering and alinement.

In welding high-carbon steel to low-carbon steel the joint is located so that the low-carbon stock extends farther from the clamps than the high-carbon stock. The high-carbon steel has the greater resistance and tends to heat faster, requiring some of the chilling effect from the clamps to retard it; moreover the high-carbon steel must not be overheated. It is generally necessary to anneal welds of high-carbon steel to remove the strains from uneven heating. It is difficult to weld steel having 0.75 per cent carbon or above.

Incandescent electric welding has many advantages over other welding methods, for these classes of work to which the electric method is adapted. Perhaps the greatest advantage lies in its possibilities for rapid production. The parts to be welded can be brought to welding temperature in a very few seconds and completed welds can sometimes be made at the rate of several hundreds per hour. The adaptability of the method to machine operation contributes largely to this advantage. The second valuable feature of incan-

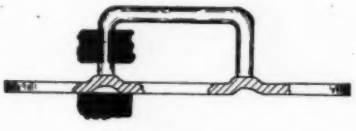


Fig. 15.

descent welding is the exact heat control possible. The temperature can be raised or lowered at will and can be exactly duplicated indefinitely. The parts are in full view while heating, eliminating guess work. Machines may even be made so that they automatically turn off the power and complete the weld at the instant the metal softens. Overheating and burning thus become practical impossibilities. The heat for welding by the electric method is generated in the metal itself at the point of welding only. It is confined altogether to the small useful zone. Greater economy is therefore secured than in forge work or hot-flame welding, where the source of heat is without and but a small portion of the energy is taken up by the metal at the weld. The heat is generated by the electric method internally and homogeneously; there can be no outside burning while the interior remains cool. Due to the skin effect, which is quite marked in the presence of the very high currents used in this process, there is a tendency for the outer portions of the metal to carry more current than the inner portions. This effect just about counterbalances the cooling from radiation. Any ten-

dency for one portion of the joint to overheat is automatically reduced since the hottest metal softens most, relieves the contact pressure, thus decreases the current flow at that point and reduces the heating. Even and uniform heat is thus encouraged.

Incandescent electric welding occasions no heat waste due to standby loss. The current is applied only during the heating interval and is disconnected at other times. The process is not attended with much smoke or dirt and there is little fire risk. Consequently the machines can be located anywhere in the plant, taking their proper sequence in production with the least trucking of materials. Electric welding is more flexible than forge welding. Many sections and shapes inaccessible and out of the question for blacksmith work may be handled easily by the electric process. Finished parts can be handled without distortion, injury or burning and without scar or scale except at the zone of the weld. The work can be held in accurate alinement and position while welding so that subsequent machining can be reduced or eliminated altogether. No scarfing is required with electric welding. Electric welding work can be made simple, mechanical work, in some cases quite automatic, so that unskilled labor can be employed. Due to the low voltage used there is practically no danger connected with the work.

The range of metals which can be welded by the incandescent electric method is large. Among the metals which can be welded to themselves are the following: steel of most grades, wrought iron, wrought and cast brass, cast iron, copper, zinc, aluminum, nickel, gun metal and bronze. Metals which have been successfully interwelded are as follows: wrought iron to cast iron, cast steel to mild steel, mild steel to tool steel, cast iron to steel, copper to wrought iron, copper to steel, copper to brass, brass to wrought iron, brass to steel, bronze to wrought iron and bronze to steel. This is not an exhaustive list, there being numerous other combinations in use.

Wrought metals lend themselves more readily to electric welding than do cast metals, since they are less brittle, soften more while heating and do not have a clearly defined melting point. Metals having a wide temperature range of plasticity are welded with comparative ease. Wrought iron and mild steel are thus favorable metals, while brass is difficult to weld since it passes quickly from the solid to the fluid stage, being plastic only within narrow limits of temperature. In welding brass or cast metals, it is usually necessary to confine the metal with a dam of fire clay or similar material or else by furnishing a retaining mold of some metal which will withstand the heat.

In welding together two pieces of metal, like or unlike, it is necessary that they both be in a plastic stage simultaneously. Different metals reach this stage at different temperatures. It is more difficult to weld together two metals having widely separated melting points than it is to weld metals which are plastic at about the same temperatures. The feat is accomplished with unlike metals by so clamping, proportioning and shaping the sections that the respective heating and chilling effects cause the piece demanding a higher temperature to actually reach the higher temperature while the other metal which might melt at such a heat, is retarded or cooled. The different electrical conductivities and heat conductivities of the metals enter here to play important parts. It will be seen that considerable study and ingenuity is required to effect just the right combination in each particular application.

The power cost is usually a considerable item in the cost of electric welding, largely because the labor cost is so much lower than with other methods. General data as to power costs for round iron and steel rods are given in Table I. Specific cases can be approximated from these data.

TABLE I.

Diameter of Rod, Inches	Area, Square Inches	Kilowatts	Seconds	Kilowatt-Hour, Per Weld
0.25	0.05	4	2	0.002
0.50	0.20	7	6	0.012
0.75	0.44	15	15	0.065
1.00	0.79	20	20	0.113
1.5	1.77	45	40	0.500
2.0	3.14	60	60	1.000

It is difficult, however, to state or to predetermine the exact amount of power required for any given section or volume of metal, since so many modifying variables enter. The shape of the section plays an important part. Round sections require the least power, since they have least surface to radiate heat to the clamps and to the air. On the contrary, thin flat sections require the most power. Identical welds may require different amounts of energy, depending upon the rate of heating. The amount of radiation depends largely upon the time taken to make the weld. If the rate of heating is made low, the heat will penetrate back from the weld further into the clamps, while, at the same time, more heat will be lost into the air. If the rate of heating be made high, the minimum energy will be required, but it then becomes more difficult to stop the welding at just the right point. Moreover, the heating is likely to be less uniform.

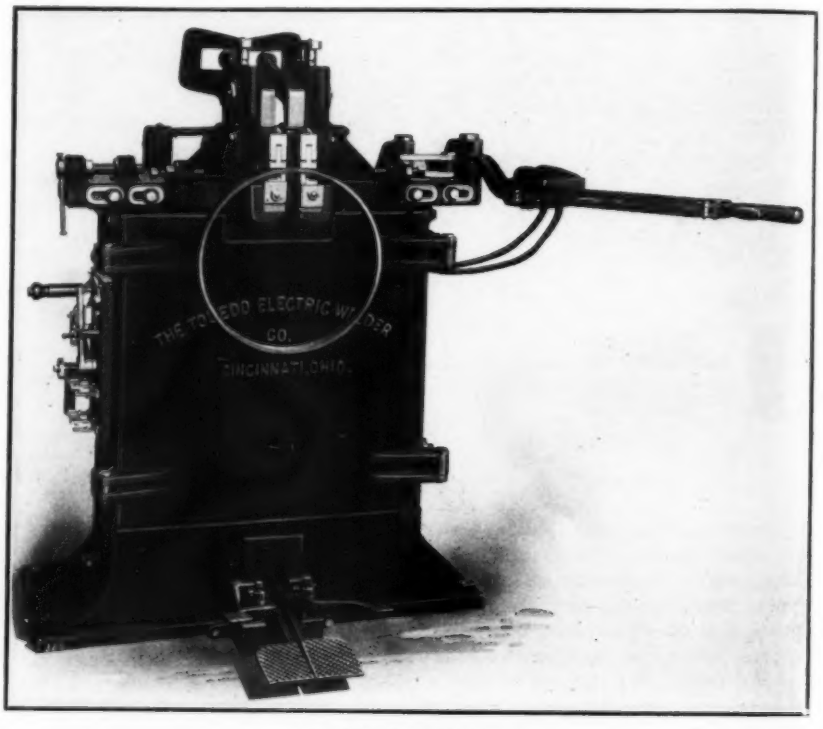


Fig. 16.—Hoop Welder.

A rough estimate of power requirements may be taken from the figures 300 to 450 kilowatt-seconds as the power required to raise one cubic inch of metal to welding temperature. These figures hold for iron, brass and copper. For metals which conduct heat away easily, such as copper, the time must be short and the rate of heating high to prevent excessive losses from radiation and conduction. The time required for most welds of iron lies within the limits of 15 seconds and one minute, the smaller sections requiring the shorter time. The rate of input

runs from 35 kilowatts per square inch for the small sections down to 15 kilowatts per square inch for large, round sections.

For electric welding by this method only alternating current can be conveniently used. Any frequency can be utilized. Electric welding causes an inductive load of about 70 per cent power-factor. This is largely due to the high induction from the heavy welding currents. A generator for welding service should be of ample size, so that the intermittent load will not cause too unstable voltage. It should have ample field turns and a liberal exciter, so that voltage can be maintained in spite of the low power-factor of the load. Where direct current only is available, a motor-generator set should be used for securing the alternating current. Inverted rotary converters are not generally satisfactory, since the low-power-factor load tends to demagnetize the fields, causing increased speed, irregular frequency and a tendency to race.

Electric welding is essentially a single-phase load, usually involves considerable peaks and is of intermittent nature. Consequently it is not most desirable from the point of view of the central station. Several arrangements of transformers have been suggested for distributing the single-phase load over two or three phases. This is an impossible proposition, since single-phase load represents pulsating flow of power, whereas multiphase load represents uniform continuous flow. It is impossible to transform one to the other without the intermediary of rotating apparatus.

The pressure required in welding of this nature varies with the character of the piece. The following figures may serve as a guide; iron requires about 1,200 pounds per square inch, copper about 600 pounds per square inch and steel about 1,800 pounds per square inch. As a result of these high pressures exerted upon the pieces at welding heat, there is usually a considerable extrusion of metal and slag at the weld joint, forming a burr. This is generally machined or ground off. Some machines are equipped with swaging blocks which are actuated in such a manner that they squeeze and form the hot metal at the weld immediately after it is forced together, smoothing away the burr and giving a finish to the piece, at the same time strengthening the weld by working it.

The average strength of electric welds made by the resistance method is very high. Average forge welds run 75 to 80 per cent of the strength of the bar. Electric welds average 85 to 90 per cent and many run as high as 100 per cent. Breakage does not always occur at the weld, the edge of the heated zone sometimes being the point of greatest weakness. Defective forge welds are usually due to underheat, overheat and burning or impurities in the weld introduced from the fire. Electric welds are likely to be more uniform since the heat is better controlled and inspected and impurities are eliminated. It is seldom necessary to use fluxes for electric welding, hence no weakness is introduced through incomplete extrusion of the flux from the weld.

A study of the characteristics of incandescent electric welding will show that it is primarily a method adapted to repetition work. The time required to set up the welding machine corresponds to the time required to set a die in a punch press. For a single weld the set-up time would be prohibitive except in the case of simple butt welds of regular shapes in so-called "universal" machines. After the welder is set up, welds can be made at rates anywhere from 50 to 500 per hour, depending upon the size and nature of the work. As a repairing process the value of incandescent welding is limited; as a manufacturing process it has a broad field, and is only beginning to receive the attention it deserves.

(To be continued.)

Chicago Telephone Company Gives Demonstration of Transcontinental Service.

Under the direction of officials of the Chicago Telephone Company a number of demonstrations of the transcontinental line between Chicago and San Francisco were given June 21, 22, 23, and 24.

On Monday, June 21, Mayor Thompson and men prominent in the business and civic affairs of Chicago were guests of Bernard E. Sunny, president of the Chicago Telephone Company, at a demonstration given in Mr. Sunny's office. Mayor Thompson exchanged greetings with Mayor Rolph of San Francisco. Mr. Sunny talked with George E. McFarland, president of the Pacific States Telephone Company. Messages were also sent by others present.

Preceding the conversations over the 2,400 mile line, Mr. Sunny addressed his guests as follows:

"It is a fact not generally understood that the great strides that have been made in developing the telephone service, and especially in building a long distance service between distant points, has not been in the telephone itself, but in the circuits and other appliances. Indeed it can be said that while the telephone itself was a remarkable invention, the aggregate of all that has been done in marshalling appliances to bring out the full possibilities of the telephone constitutes in itself an equally great invention.

"What has been done in the development of the telephone service, local and long distance, ranks with the best that has been achieved in all of the arts and sciences in a land where we have come to accept the best that men can produce as temporary facility, to be borne with as patiently as possible until a new best is created."

In the Red Room of the Hotel La Salle on June 22 a demonstration was given for women. Mrs. B. E. Sunny acted as hostess to about 500 guests.

On June 23 members of the Association of Commerce talked with San Francisco, the necessary equipment being provided at the weekly luncheon.

On June 24 a demonstration of the transcontinental line was given at a luncheon attended by 500 visiting delegates to the convention of the Associated Advertising Clubs of the World. Clifford Arrick, publicity manager for the Chicago Telephone Company, acted as master of ceremonies.

Accelerating Delayed Patents.

It has been the policy of Commissioner of Patents Thomas Ewing ever since he assumed office to facilitate the work of the United States Patent Office in every possible way. He has taken special measures from time to time to reduce the number of long-pending cases which have obstructed the consideration of new applications and tied up many inventions for long periods, over ten years in some instances. To further accelerate these delayed cases he has issued the following order:

After January 1, 1916, all applications which have been pending for more than three years or which have an effective filing date running more than three years shall be made special and any amendment or other action therein by or on behalf of the applicant which does not put the application in condition for allowance or final rejection, shall be submitted to a law examiner for his approval of its entry.

Electrical Devices for India.

The development of electricity has made considerable progress in British India, and American manufacturers of electric power equipment and the many devices which use such power will find a growing market there. For their benefit the New Handbook on India, just off the press, includes complete information about electricity in India —the electric plants, and the voltage, cycles, unit price, etc., of the current furnished. The book also includes chapters on the opening for the sale of electrical devices. This 640-page volume, with map, may be had for $1 from the Superintendent of Public Documents, Washington, D. C.

Massachusetts Hydroelectric Companies.

The hydroelectric companies in Massachusetts, with an aggregate capitalization of about $15,000,000, are described in the thirtieth annual report of the Gas and Electric Light Commission of that state. These companies came under the supervision of the Board August 1, 1914, under an act which codified the gas and electric laws of Massachusetts.

As shown by the accompanying map, long-distance transmission lines form an extensive network, covering the central and western portions of the state. The eight companies or groups operating the hydroelectric systems are as follows.

The Central Massachusetts Power Company was organized as a voluntary association in 1912 and acquired a plant on the Quaboag River in Palmer, later buying a steam plant. The present water generating station has a capacity of about 900 kilowatts and the steam station 2,250 kilowatts. It sells energy to the Central Massachusetts Electric Company and to the Springfield Street Railway Company, owning no transmission lines.

The Franklin County Power Company owns a developed water power on Millers River, with a 300-kilowatt plant. It owns no transmission lines, the electricity generated being sold to a mill and to the Athol Gas and Electric Company.

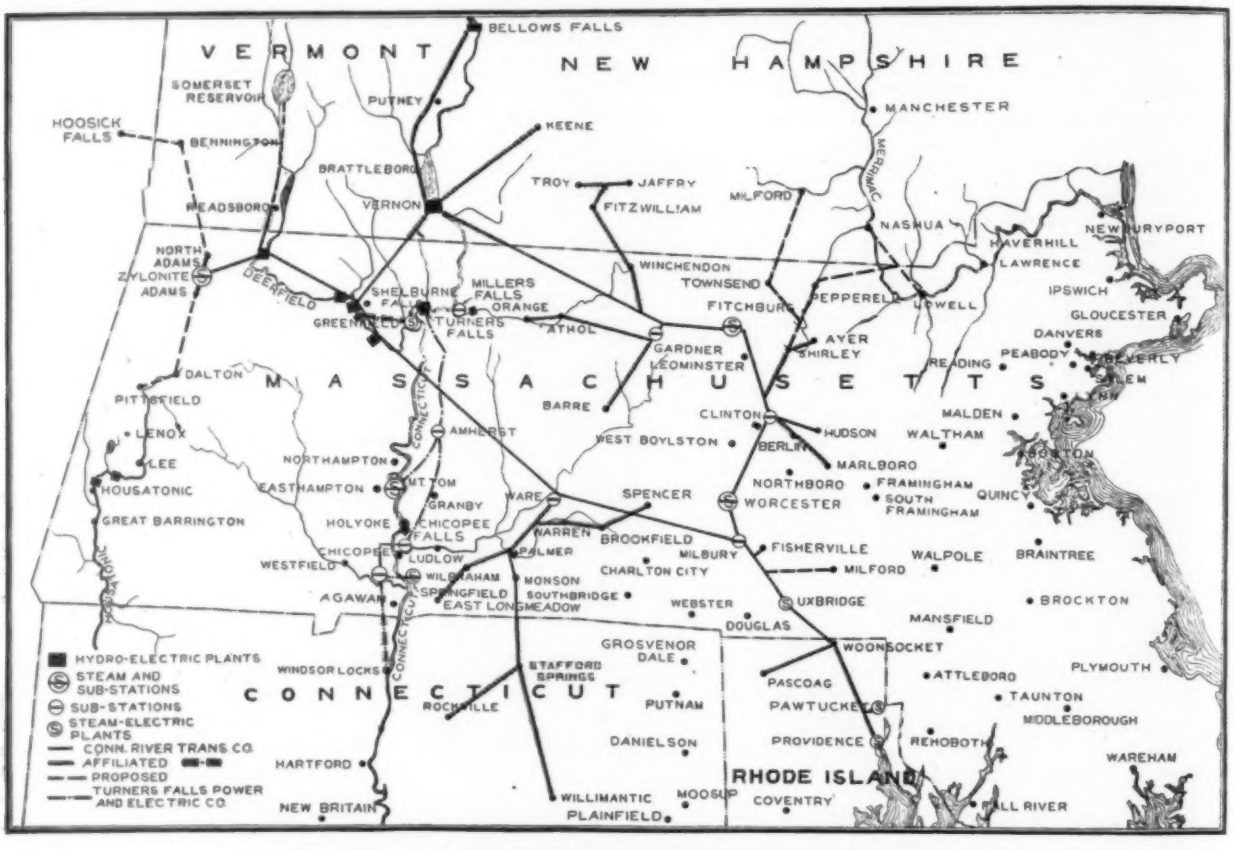
The Holyoke Water Power Company was chartered in 1859. It sells hydraulic power to Holyoke mills and has a generating station of 1,500 kilowatts in water, and 1,500 in steam, units. Electricity generated is sold to power customers in Holyoke and South Hadley, being transmitted over the company's lines.

The Millers River Power Company was organized to develop and operate water power and electric plants, and owns undeveloped water privileges on Millers River, but is not an operating company.

Monument Mills, at Great Barrington, is engaged primarily in textile manufacture, but owns two power plants on the Housatonic River, with electrical equipment consisting of water units of 1,000 kilowatts capacity and steam units of 500 kilowatts. The energy generated is used at the company's mills and sold to the Great Barrington Electric Light Company and Stockbridge Lighting Company, the transmission lines being owned by these companies.

The New England Power Group consists of the Connecticut River Power Company of New Hampshire, with a 20,000-kilowatt hydroelectric plant at Vernon, Vt., and transmission lines which deliver current to Brattleboro and Bellows Falls, Vt., and to the Connecticut River Transmission Company's lines at the Vermont-Massachusetts boundary; the New England Power Company, which owns four hydroelectric developments on the Deerfield River, with an installed capacity of 21,000 kilowatts; the Deerfield River Power Company, which owns a large storage reservoir at the Deerfield headwaters in Vermont; and the Connecticut River Transmission Company, which owns high-tension lines extending from the power plants of the New England Power Company to substations at Adams, Clinton, Fitchburg, Gardner, Millbury, Ware and Worcester, and to the Rhode Island and Connecticut lines, connection being made at Clinton with the station operated by the State of Massachusetts, utilizing the overflow of Wachusett Reservoir.

The Turners Falls Group comprises the Turners Falls Company, owning a large water-power development on the Connecticut River, from which it sells hydraulic power to mills, and in addition has a hydroelectric plant of 5,000 kilowatts capacity, selling energy to the Greenfield Electric Light Company and the Amherst Power Company. A new station, located at the end of an enlarged canal and forebay, soon to be put in operation, will develop 36,000 kilowatts. The Turners Falls Power and Electric Company owns the high-tension lines, fed by the Turners Falls Company, through towns along the Connecticut valley and sells electricity to the Amherst and Easthampton gas companies, the Greenfield Electric Light & Power Company and the Agawam Electric Company. Both above power companies are interested in the companies served.



Map of Territory Served by Massachusetts Hydroelectric Companies.

SIMULATING OLD ILLUMINANTS.

By M. Luckiesh.

The light user has been learning gradually that it is legitimate and also desirable to demand the quality of light that suits his utilitarian needs or satisfies his esthetic taste. He is beginning to recognize that an illuminant whose color value or spectral character is accidental (that is, determined by circumstances over which the manufacturer has little control) need not be accepted by him as satisfactory in all cases. For this reason there has been an urgent demand for artificial daylight where accurate color work is done and where colors should appear as they do in daylight. Likewise there has been an insistent, though less urgent, demand for converting the color of modern illuminants into the "warmer" tints of the older illuminants.

The recent increase in the luminous efficiency of incandescent lamps has made it possible to produce artificial daylight, namely north skylight, for accurate color work and noon sunlight for general lighting purposes, at efficiencies sufficiently high to be practicable. For the same reason it is possible to enjoy the "warmer" tints of the older illuminants if the esthetic sense insists. However, the alteration of the light from the incandescent lamp to that of the older illuminants is a problem far less difficult than the production of artificial daylight; nevertheless, the attempts to do this that have come under the writer's observation have not appeared satisfactory. It is desirable to understand, however, that the demand for stimulating the spectral character of older illuminants is purely a matter of personal taste, while the demand for artificial daylight is independent of taste, in most cases being a scientific and practical necessity.

There are many interesting, conflicting, and amusing statements to be found regarding the physiological and psychological influence of color. As a matter of fact, little is known accurately regarding this problem and it appears to the writer that while scientific information on this subject is highly desirable, the present lack of information should not worry the user of light. It is quite legitimate to demand an alteration of modern incandescent lamps to the color of the old kerosene flame but it is not proper to enforce upon others a condition that is at present only governed by taste. The failure to distinguish between matters of fact and matters of taste has left in our lighting literature, statements that are highly amusing when compared with each other. One writer makes the statement that tungsten light is so white that it gives him the blues. We have much to learn in lighting procedure but why complicate matters with the proclamation that a yellow light is so white that it makes one feel blue? If that be true, why does not that same person feel very blue under daylight? If light from the kerosene flame, the carbon and the tungsten incandescent lamps be compared at equal intensities with daylight it is seen that the first three illuminants are quite in the same class in regard to color. That is, while they are quite different from each other when compared in the absence of daylight, their differences in color are small compared to their difference from daylight.

On the physiological side of the problem we find some claiming (without any sound reason apparent to the writer) that yellow light is more glaring than light of any other color. Contrarily many claim it is "easier on the eyes" for reading purposes. These physiological problems while very difficult to study owing to the vagueness of the criterion, can be solved; however, the problems involving merely the esthetic taste are indeterminate. For several years the writer has experimented with artificial daylight versus yellow light for reading and has concluded that for him the former is less fatiguing. This is recorded merely as another bit of evidence to add its meager influence in future summaries.

This extended introduction has appeared necessary owing to the indefinite and inaccurate statements that have been made regarding the desirability of simulating the color of older illuminants. The writer has found such a change very pleasing in some instances in home lighting and inasmuch as many are of the same opinion, has given the matter of altering modern tungsten-lamp light considerable attention, which will be briefly discussed.

The transmissions of ideal screens for converting the light from vacuum tungsten lamps of various luminous efficiencies to the exact spectral character of the old carbon incandescent lamp (3.1 watts per mean horizontal candle) and of the kerosene flame have been computed and the resulting luminous efficiencies have also been determined. In Fig. 1 curve C_t represents the transmission of the ideal screens for converting the light from vacuum tungsten lamps operating at various efficiencies into light of the same spectral character as that of the carbon incandescent lamp. Curve K_t is a corresponding curve for the ideal screens which convert the light from vacuum tungsten lamps into light of the same spectral character as the kerosene flame.

On combining the transmission of the ideal screen in any case with the luminous efficiency of the unscreened illuminant, the luminous efficiency of the altered light is obtained. That is, curve C_E represents the final luminous efficiencies of the vacuum tungsten lamps after they have been screened

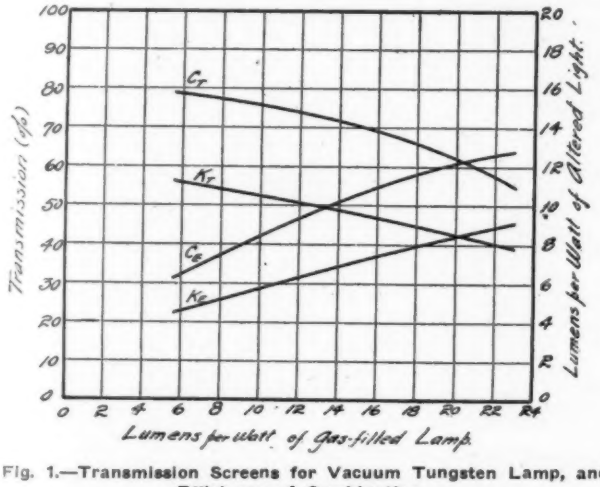


Fig. 1.—Transmission Screens for Vacuum Tungsten Lamp, and Efficiency of Combination.

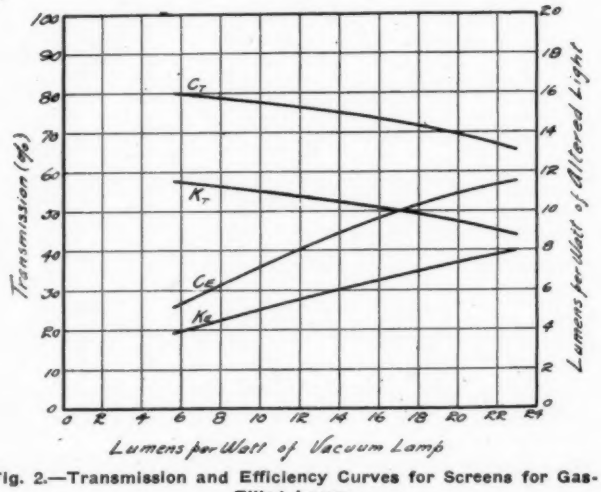


Fig. 2.—Transmission and Efficiency Curves for Screens for Gas-Filled Lamp.

to match a carbon lamp in color. K_c is a corresponding curve representing the resultant efficiencies of the vacuum tungsten lamp screened to match the kerosene flame.

In Fig. 2 the corresponding data are given for gas-filled tungsten lamps.

In Fig. 3 curve C represents the spectral transmission curve of the ideal colored screen for altering the light from a vacuum tungsten lamp (operating at 7.9 lumens per watt) to an exact spectral match with the light from the carbon incandescent lamp under consideration. Curve K represents the spectral transmission curve of an ideal screen for converting this tungsten light to a spectral match with the light from a kerosene flame. Curves C′ and K′ in Fig. 4 are similar curves of corresponding ideal screens for the gas-filled tungsten lamp operating at 22 lumens per watt. Similar computations have been made for tungsten lamps operating at various efficiencies, which data have been used in plotting the curves shown in Figs. 1 and 2.

In producing practical colored screens for the above purposes the obvious beginning is to use a yellow pigment. It is a noteworthy fact that there is no suitable yellow pigment that alone will suffice. This is not surprising to one familiar with coloring elements, but it has not been recognized by those attempting to simulate the color of the old illuminants, if observations are to be relied upon. Most so-called yellow pigments are greenish in appearance in the lesser densities and become a deep orange when quite dense, but at no density do they match the unsaturated yellow of the old illuminants. Usually a pigment known as amber is considered the proper tint for the above purpose. Of a number of yellow pigments examined (and these represent perhaps all of the permanent yellow pigments) it has been found that no density will produce a screen for use with tungsten lamps that will alter the light to match that of old illuminants such as the kerosene flame. An example is shown of so-called amber glass of four different densities in Figs. 3 and 4. The numbers on these curves represent the relative amounts of coloring matter present per unit area of the amber glasses. In general it is seen that the glass transmits green rays too freely. In order to make this point clear, the transmission curves C and K in Fig. 3 have been plotted equal to unity for all wave-lengths in Figs. 5 and 6 respectively, and the transmission of the amber screens are made equal to unity at 0.70 micron., the practical limit of the visible spectrum. It is thus seen that no density of a so-called amber glass will suffice for the purpose under consideration.

These curves for an average yellow pigment have been presented to illustrate that it is not an extremely simple matter to simulate the color of the older illuminants by using colored screens with the tungsten lamps. However, inasmuch as the requirements do not demand more than a close approximation, one familiar with pigments and color mixture can readily produce a

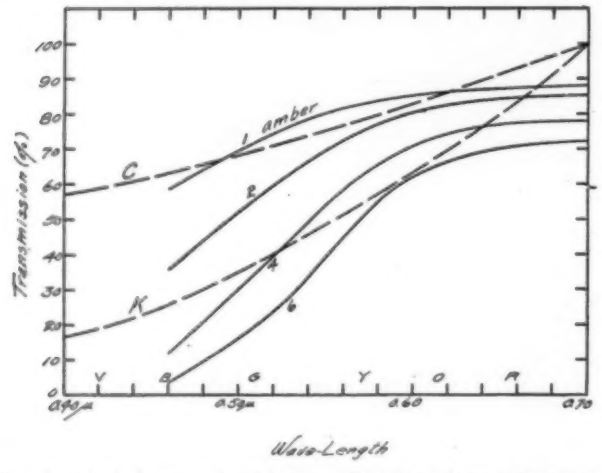


Fig. 3.—Ideal Screens for Vacuum Tungsten Lamp Compared with Amber.

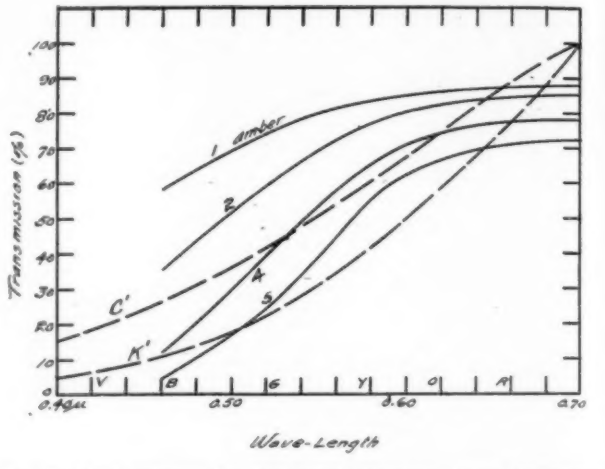


Fig. 4.—Ideal Screens for Gas-Filled Tungsten Lamp Compared with Amber.

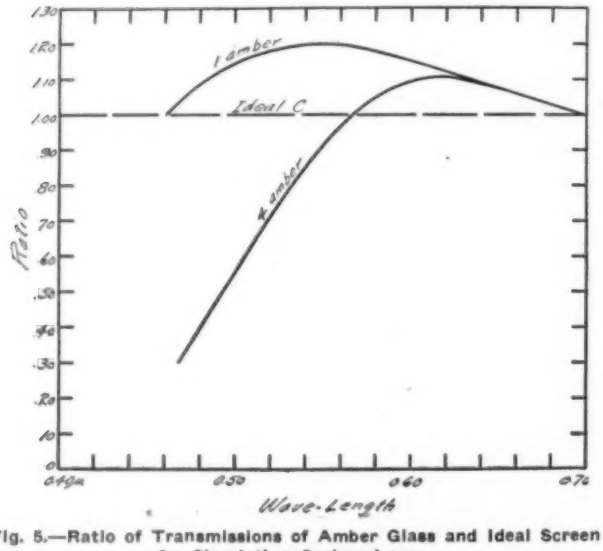


Fig. 5.—Ratio of Transmissions of Amber Glass and Ideal Screen for Simulating Carbon Lamp.

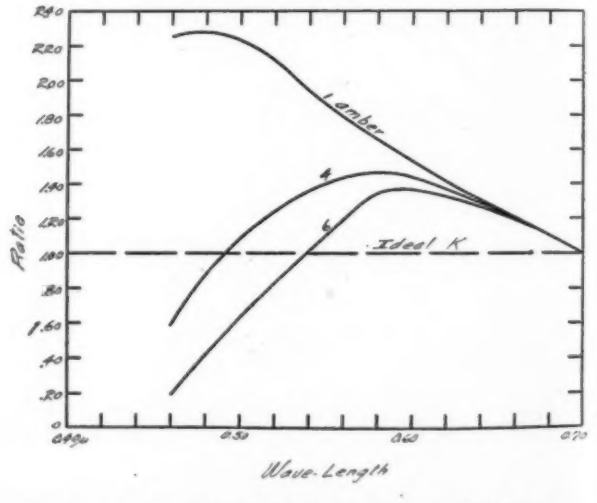


Fig. 6.—Ratio of Transmissions of Amber Glass and Ideal Screen for Simulating Kerosene Flame.

proper coloring. The writer has done this without difficulty. On viewing a tungsten lamp that has been colored so that its light is altered to match the old illuminants, the truth of the foregoing is strikingly evident. That is, the ordinary amber lamps appear very different from the unsaturated yellow of the properly colored lamps.

The writer acknowledges the assistance of Mr. H. McMullan in making the computations.

Flood Prevention, Water Power and Navigation.

The recurrence of floods in some parts of the country has again aroused consideration of systematic efforts at their prevention. In this connection it is of interest to note how the problem has been most advantageously solved in the Province of Silesia, Germany. The following is from a recent consular report in which this matter is referred to.

About 20 years ago an investigation was made to devise ways of preventing the destructive floods in the spring of each year. As a result of this investigation a system of dams and reservoirs was constructed to catch and hold the surplus water and then regulate its flow into the Oder River. This system soon revealed commercial possibilities which have since been realized. In addition to their primary object of protecting the valley from floods, these reservoirs have now been utilized for large power plants, from which electrical energy is transmitted to all parts of the province. It has also been found that by a conservation of this surplus water in the dams during the freshet seasons and its systematic release during the summer, when the Oder often runs very low, navigation on the river can be extended throughout the dry period, thus adding to the transportation facilities of the district. The Province of Silesia bore one-fifth of the cost of construction of these dams and the State of Prussia bore the rest. The province further assumed all the cost of maintenance and built the power plants at its own expense. The State is reimbursed for its investment out of the earnings of the project.

Plans for Electrical Prosperity Week.

A 20-page booklet has been issued by the Society for Electrical Development, Incorporated, outlining the plans for Electrical Prosperity Week to be held November 29 to December 4, 1915, under the auspices of the Society. The booklet first explains the idea back of this important coming event and the generous co-operative spirit among all electrical interests and even some that are non-electrical in actively furthering the movement. It is pointed out that while the various branches of the electrical industry are peculiarly interested in making Electrical Prosperity Week a grand success on account of the direct profit this will bring to them, the public and the country in general will benefit in no small degree, because the increasing use of electricity and of electrical appliances makes for general progress, comfort, economy and health. A distinct feature of value will be the stimulus that the dates for Electrical Prosperity Week with its extensive publicity will give to early Christmas shopping, a feature that is making special appeal to non-electrical merchants and securing their hearty support. Those who are actively cooperating for the success of the event are the central stations, electrical manufacturers, jobbers, contractors, dealers, local and national electrical organizations and electrical journals.

Official Design for Electrical Prosperity Week.

An outline of the scope of the publicity already being given and of the unprecedented variety and volume of advertising and other publicity planned for the months and especially the week preceding Electrical Prosperity Week takes up much of the present booklet. A unique feature of this publicity is the design that has been adopted for the Week. Its appropriateness is apparent from the reproduction of the design in the accompanying cut. This design will be used on poster stamps, in window displays, on billboards, in newspaper and magazine advertising.

Among features planned for the Week are special illuminations of business streets, central-station offices, power plants, stores and store windows, etc.; electrical parades; popular lectures on electricity; visits to power plants; displays of electrical appliances in operation and demonstrations of the utility and value thereof.

BOOK REVIEWS.

"Electric Railway Handbook." By Albert S. Richey, assisted by William C. Greenough. New York: McGraw-Hill Book Company, Incorporated. Flexible leatheroid, 832 pages (4x6¾ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $4.00.

This must be the season for handbooks, for they have been appearing with considerable regularity for some time. The book before us is not only one of the most recent of the crop, but it covers a field which has for a long time lain fallow. As the author points out in the preface, the field of the electric railway engineer is so broad that the information needed could be found only by an extended search through technical journals, proceedings of technical societies, and electrical, mechanical, or civil engineers' handbooks. The need of a book of concentrated information is thus quite evident.

The aim of the book is to make available with less trouble a vast amount of information on standard practice in the construction and operation of electric railways. This information has been collected and classified under eleven heads or chapters as follows: Roadbed and Track; Buildings; Train Movement; Railway Motors; Controlling Apparatus; Current-Collecting Devices; Trucks; Braking; Rolling Stock; Transmission and Distribution; Signals and Communications. Under these headings is given reliable information on some 2,000 separate items. The chapter headings do not always give an idea of the details in which the topics are covered. For example, under "Roadbed and Track" much space is given to a discussion of engineering costs of roadbeds, transmission lines, car-house construction, right of way and miscellaneous. Thus not only the best methods are outlined, but the relative costs of the different elements entering are given. In every case the information is specific and detailed. In many instances references are given to other sources of information. This is a valuable feature.

The multiplicity of the topics discussed (about 2,000 are given in the index) makes it impractical to mention many in a short review. Suffice it to say that the topics are well selected, well arranged, and treatment is clear and to the point. The many illustrations aid in giving a clear understanding of the operation and construction of electric railway equipment. The index is complete, which is a commendable feature. Nowhere after an item have I seen the words "see such and such a topic." It takes no more printers' ink to insert the page number than the indirect reference, and is considerably less trying on the patience of the reader.

This book should prove very useful to practicing engineers as well as to the teacher and student. Both the author and

the publishers are to be commended for making available such a storehouse of useful data and practical information. The book is bound in the well known style of the other handbooks published by the McGraw-Hill Book Company.

C. M. JANSKY.

"Practical Lessons in Electricity." By R. A. Millikan, F. B. Crocker and John Mills. Chicago: American Technical Society. Cloth, 334 pages (5½x8¼ inches), illustrated. Supplied by Electrical Review Publishing Company, Inc., for $1.50.

According to the title page of this book, it consists of "a simple presentation of fundamental electrical principles and their application to direct and alternating-current problems." In the introduction, it is stated that the volume should be "especially adapted for purposes of self-instruction as well as a manual of information for the experienced electrical worker." The book fulfills these claims with very different degrees of success in its different sections or parts, which appear to have been written by the different authors quite independently of each other, and without collaboration. The numbering of the pages is not continuous throughout the volume, but begins anew with each part, as if the volume consisted of four disconnected treatises bound up together.

Part I consists of 69 pages on "Elements of Electricity and Magnetism." A note explains that this part is a modification and abridgment of the treatment of magnetism and electricity found in Millikan and Gale's "First Course in Physics." This part fulfills admirably the claims made on the title page and in the introduction, and can be criticized only on some minor points. It does not appear to have been brought up to date very carefully, since on page 3, the discovery of the Heussler alloys is placed "within the last five years"; and on page 48, the definition of the ampere is given from the action of the Electrical Congress of 1893, with no mention of more recent international action. On pages 55 and 56, the term *induced current* is used throughout the discussion of electromagnetic induction, without making it sufficiently clear that it is electromotive force rather than current which is induced. On page 61 the word dynamo is used to refer to a generator as distinguished from a motor.

Part II consists of 63 pages, on "Direct-Current Dynamos." This part of the book also meets the claims of the title page very well, and requires criticism only on minor points. Several pages are devoted to the discussion of principles which are already fully discussed in Part I. On page 1, it is said that a dyne "is equal to 1/198 of a gram or 1/2800 of an ounce."

Part III consists of 91 pages, on "Elements of Alternating Currents." This is a purely theoretical discussion, and not at all in line with the other parts of the book. In fact this section seems to the reviewer to be wholly out of place in a book on elementary practical electricity, although no fault need be found with it as a presentation of the pure theory of alternating currents. It does not contain any description of an actual alternator; and there is no mention, either descriptive or theoretical, of the transformer, or of any type of alternating-current motor.

Part IV consists of 95 pages, on Storage Batteries. This is an excellent practical treatise. After describing different types of storage batteries and their management, brief sections are given on troubles and remedies, and on tests, and then 50 pages are devoted to commercial applications.

Considering the book as a whole, it suffers from the lack of connection between its different parts; and while each part treats satisfactorily the specific subject with which it deals, the combination does not furnish a well rounded treatment of practical electricity.

The typographical work is excellent, and the illustrations are numerous and good.

J. R. BENTON.

"American Handbook for Electrical Engineers." By Harold Pender and a staff of specialists. New York: John Wiley & Sons, Incorporated. Imitation leather, 2023 pages (4x7 inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $5.00.

It seems to be hopeless to expect that any engineer's handbook will attain to the ideals of the user. One after another comes out, some defects are eliminated, others remain and perhaps new ones are introduced. The volume before us appears to be an improvement over the previous electrical handbooks, but cannot be considered to be the last word on the subject. The wants of different engineers will vary, of course, and it is impossible to please all. For if a handbook contains everything that might be demanded of it, it becomes too bulky for convenience, and is objectionable to some on that score. This criticism may fairly be made of the present volume, which is excluded from the class of pocketbooks. Its thickness is almost 2.5 inches, which at once restricts it to desk use. In the reviewer's opinion it is preferable to have a handbook smaller. This can be done, while retaining data and matter required for field use, by excluding much of the theory and other matter that is available in standard treatises, equally easy of reference in library or office. As an example of this might be mentioned the matter under "Principles of Mechanics," giving definitions and mathematical relations. It is not necessary that a handbook be an encyclopedia of engineering knowledge.

One of the conspicuous features of this book is its arrangement of topics in alphabetical order, instead of grouping by subject. This, however, is not carried out as fully as in a dictionary or encyclopedia, so that it is doubtful if it is of any advantage, as one will frequently look first under a wrong heading and might as well look in the index at the start. Thus the only reference to electric welding comes under "Bonds, Railway Track," and to electric cooking under "Heating." The heating of cars, on the other hand, comes under "Railways." One is in doubt, in cases such as Storage Batteries, whether to look under "storage" or "batteries," and so with electric vehicles and many other subjects. Reference to the index is consequently necessary, and fortunately one has been provided.

The book has many features to commend it. The treatment of all subjects is similar in method; descriptive matter, theory, design, testing, etc., being taken up in definite order. Bibliography and costs are given and the latter feature is a very desirable improvement over most handbooks. The typography is good and editing and proofreading seems to be thoroughly done. The book contains a wealth of information, but the reader who expects it to supply all his wants is doomed to disappointment. For example, the reviewer had occasion to look up the following items without finding the information sought; high-tension fuses, electric welding, freezing temperature of electrolyte, effect of temperature on magnetic properties, magnetic hysteresis in a rotary field. This, however, is a fault of every handbook, and the present volume will readily be accorded a place at the head of the electrical list.

"The Mechanics of Electricity." By F. J. B. Cordeiro. New York: Spon & Chamberlain. Cloth, 78 pages (5x7½ inches), seven illustrations. Supplied by the Electrical Review Publishing Company, Inc., for $1.25.

The author of this volume has endeavored to put forward in concise form the idea that electricity is a definite entity, which, in his view, is identical with ether. Known phenomena are stated in terms of this point of view, and enough mathematics introduced to demonstrate the quantitative relationships. The treatment is brief, but the essential ideas are presented in a very readable form. The subjects dealt with are the ether and its properties; longitudinal waves and their resulting attractions and repulsions; vortex filaments, comprising magnetic lines and electromagnetic waves; static electricity; electrochemistry; Maxwell's theory; and a discussion of various phenomena such as light, electrons and X-rays.

Studies are being continued for the development of water power on the Aconcagua, Maipo, Cachapoal, Laja, and Cautin Rivers, in Chile, which will form the basis for future industrial expansion.

New Electrical and Mechanical Appliances

Duplex Wall Receptacle.

The continually increasing demand for electrically operated devices causes many householders to regret that their rooms were not wired with more outlets. This demand can be conveniently met and the number of the outlets originally provided can be doubled by placing in each existing standard receptacle box one of the new Bryant Junior duplex receptacles—all without adding to or changing in any way, the original wiring or outlet-box installation. As will be noted from the illustration, this duplex receptacle is the practical combination of two receptacle units on a single plate.

It may also be used in floor outlet boxes as it has the smallest openings of any device of this character and is therefore claimed to be the nearest waterproof. The small porcelain bosses which receive the points of the plug are flush with the surface of the plate; therefore, when this device is used with a square-edged plate it is possible to provide a smooth and unbroken floor surface. This receptacle is particularly desirable also for attaching standard table lamps; the plug fitted with long prongs can be inserted in the receptacle through a rug with practically no damage, only two small holes being required for the points to penetrate. At this time of the year when fans are so much in demand, this device forms a convenient means for connecting such without interfering in any way with the present use of lamps and existing extensions using single outlet boxes.

Duplex Flush Receptacle.

These duplex receptacles are manufactured by the Bryant Electric Company, Bridgeport, Conn.

Fargo Busbar Tap.

In equipping power houses and substations it is highly important to keep in mind that dependability should be one of the strong points of central-station service. Consequently it should be possible to make replacements of damaged apparatus in the least possible time so as to maintain a high standard of continuity of service.

This was one of the features considered in the design of the busbar tap illustrated herewith. It can be very quickly applied at any point of a tubular busbar to permit adding an extra branch circuit, a new transformer, or other apparatus, all without cutting or disturbing the busbar.

Fig. 1.—Busbar Tap.

The construction of this busbar tap is shown in Fig. 1 and its use in Fig. 2. The tap is made of high-conductivity metal and is shaped so that the cylindrical contacts exactly fit the busbar. When the wedging nut is screwed down the contact is so intimate as to practically constitute a cold weld. The contact has about three times the conductivity of the wire used in the tap. Consequently the ordinary losses due to contact resistance are eliminated. Other savings result from avoiding cutting the tubing and threading it for couplings. The labor and time involved in making a tap are insignificant.

Fig. 2.—Tap in Use.

These busbar taps are made in several sizes. The ones shown are intended for three-quarter-inch tubing and will take a tap circuit from No. 6 to No. 0 B. & S. gauge wire. These taps are made by the Fargo Manufacturing Company, Incorporated, Poughkeepsie, N. Y.

Demonstration of Welding Apparatus.

A demonstration of the arc welding apparatus of the Lincoln Electric Company, Cleveland, O., was given on the afternoon of July 19, at the factory of Roth Brothers and Company, Chicago. Robert E. Kinkead, sales engineer of the company, first made an address to the forty or fifty guests who were present in regard to the different methods of welding and the essentials of the welding process. He then explained the characteristics of the Lincoln apparatus and had an assistant make demonstrations of welding by the use of same.

The apparatus exhibited has as one of the principal features a generator of the constant-current type which supplies current to the welding electrodes without the interposition of any dead resistance. It is on this account that the process of welding can be carried out so much more cheaply by the Lincoln apparatus than by any form in which it is necessary to control the current by the insertion of power-consuming resistance. The machine exhibited had a capacity of 100 amperes. It consisted of a motor-generator set driven by alternating current and with a separate exciter mounted on the same shaft. The field of the main generator contains regulating resistance which can be adjusted according to the strength of current needed in the welding circuit. When the elctrodes are short-circuited the voltage of the machine drops, but the current does not rise to an abnormal value. Greater stability of the welding arc is provided by the insertion in series with it of a reactance or stabilizer.

Demonstrations of welding with both

carbon and metal electrodes were given and the possibilities of applying this process to a variety of work were explained by Mr. Kinkead. Units of the type shown can be operated in parallel when larger currents are desired. Single machines with capacities up to 600 amperes are available.

Sangamo Meter Exhibit Receives Medal of Honor.

The International Jury of Awards of the Panama-Pacific International Exposition, San Francisco, Cal., has awarded the Medal of Honor, the highest award for an exhibit of watthour and ampere-hour meters to the Sangamo Electric Company, Springfield, Ill.

The Sangamo exhibit is a very interesting one. A view of the attractive exhibit-booth, which is located in the Palace of Machinery, is shown herewith. The exhibit consists exclusively of electric meters and their accessories; to make the display more striking and instructive, considerable equipment with which the meters are used is installed in the booth. In this line is part of an automobile with Delco electric self-starting and lighting equipment and a Sangamo ampere-hour meter to show at all times the condition of the storage battery. A small gas-engine-driven lighting plant is in operation, supplying part of the current for lighting the booth; with it is an ampere-hour meter for indicating the state of the battery charge and controlling the limits of charge and discharge. A U. S. L. axle-driven car-lighting set is shown with electric tachometer and battery indicating and controlling ampere-hour meter. The vestibule of a street car with controller and ampere-hour meter is also shown.

A large dial indicating through remote control the total alternating-current load of the Palace of Machinery is conspicuously hung. There are also several marble switchboard panels with a varied assortment of Sangamo meters arranged in circuits so that the visitor can readily operate them. Two racks for testing direct-current and alternating-current meters and instruments are also provided. There are also several showcases containing meter transformers, shunts and portable testing meters, parts of typical ampere-hour and watthour meters, and method of assembling meters.

Each part of the exhibit is laid out so that the visitor can easily study the action of the meters and instruments displayed. Demonstrations of the operation and testing of the meters are made at various times. Aside from the educational exhibit, the booth contains an attractive rest room, where visitors will be made welcome and will find comfortable facilities for resting, reading or writing.

Exhibit Booth of Sangamo Electric Company.

General Electric Makes Gain.

"There has been an eminently satisfactory, but not a sensational betterment in the volume of General Electric's business since January 1," says the Boston *News Bureau*. "During the first two months of this year, incoming orders were at the rate of but $73,000,000, a shrinkage of 20 per cent from the level of sales billed out during 1914. Back in the first quarter these figures were regarded as forecasting the smallest business the company had had since 1911.

"But orders have picked up in one way and another since March 1, with the result that the first half year, the period concluded June 30, recorded incoming business at the rate of about $88,000,000 per annum, a gain of 20 per cent over the low figures for the first two months."

Large Starter and Speed Regulator.

The Industrial Controller Company, Milwaukee, Wis., has recently developed a combination starter and speed regulator of the multiple-switch type which has many novel features. A view of it is shown herewith.

The first three switches of this controller are used for starting duty only, the next four for speed reduction by means of inserting resistance in the armature circuit, and in addition to speed reduction, speed increase above normal speed is obtained by inserting resistance in the shunt field.

This controller is arranged with two levers for operating the switches. One of these levers must be held up by the operator with his left hand while the first three switches are put in place with the right-hand lever. Should the left-hand lever be released at any time before these three switches are set, they will all return to the off position, thereby preventing the use of the first three switches for anything but starting duty. When these switches have been set, the remaining four may be operated in or out at will by means of the right-hand lever.

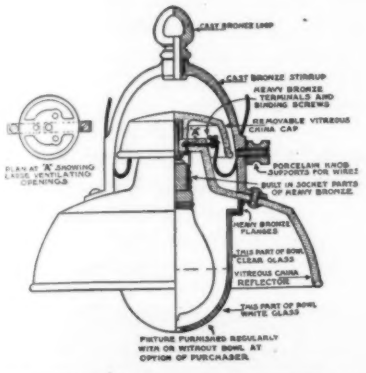
Multiple-Switch Starter and Speed Regulator.

The shunt-field resistance is inserted when all of the multiple-switch levers are in place by means of a small lever on the lower panel. No-voltage-release protection is provided so that should the line voltage at any time fail or be interrupted, all of the field and armature levers will immediately return to the off position, thereby stopping the motor and protecting it against injury on return of the line voltage.

The American consul at Sao Paulo, Brazil, wants catalogs and price lists in order to answer trade inquiries.

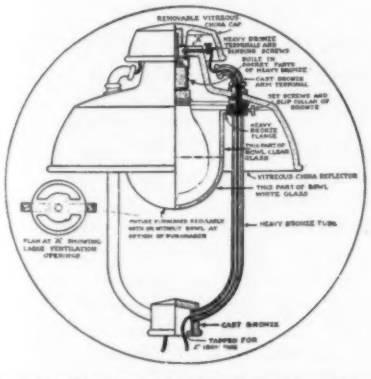
New Outdoor Incandescent Lighting Unit.

The outdoor lighting fixture illustrated herewith and known as the "dayway" has recently been produced by the Luminous Unit Company, St. Louis, Mo. It is produced in two forms, one for suspension from brackets, mast arms, cross spans, stems, etc., the other for mounting on ornamental or plain posts. Either of the types is supplied with a partially clear and partially diffusing glass bowl which incloses the lamp, affording optical protection, as well as mechanical protection to the lamp. This bowl is supplied as optional equipment, the distribution characteristics being approximately the same in either case. Exposed or concealed wiring may be used with either type of fixture, as duct space is provided in the supporting structure as well as arrangements for mounting insulators.


CAST BRONZE LOOP
CAST BRONZE STIRRUP
HEAVY BRONZE TERMINALS AND BINDING SCREWS
REMOVABLE VITREOUS CHINA CAP
PLAN AT X SHOWING LARGE VENTILATING OPENINGS
PORCELAIN KNOB SUPPORTS FOR WIRES
BUILT IN SOCKET PARTS OF HEAVY BRONZE
HEAVY BRONZE FLANGES
THIS PART OF BOWL CLEAR GLASS
VITREOUS CHINA REFLECTOR
THIS PART OF BOWL WHITE GLASS
FIXTURE FURNISHED REGULARLY WITH OR WITHOUT BOWL AT OPTION OF PURCHASER

Construction of Suspended Dayway Unit.

Constructional features of this new unit are of particular interest in view of the fact that a consistent effort has been made to produce a unit which will not only be highly efficient but which will be virtually indestructible under any service conditions.


REMOVABLE VITREOUS CHINA CAP
HEAVY BRONZE TERMINALS AND BINDING SCREWS
BUILT IN SOCKET PARTS OF HEAVY BRONZE
CAST BRONZE ARM TERMINAL
SET SCREWS AND SLIP COLLAR OF BRONZE
HEAVY BRONZE FLANGE
THIS PART OF BOWL CLEAR GLASS
VITREOUS CHINA REFLECTOR
THIS PART OF BOWL WHITE GLASS
FIXTURE FURNISHED REGULARLY WITH OR WITHOUT BOWL AT OPTION OF PURCHASER
HEAVY BRONZE TUBE
PLAN AT X SHOWING LARGE VENTILATION OPENINGS
CAST BRONZE
TAPPED FOR

Construction of Unit for Post Mounting.

The reflector and cap are of vitreous china of sufficient weight to resist a heavy blow without breaking, thus insuring them against any accidental or intentional blows which might be inflicted. Vitreous china is absolutely impervious to all action of the elements, sulphurous smoke, fumes, etc., and is, therefore, substantially indestructible.

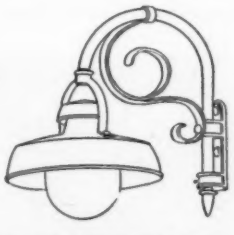
All metal parts used in the construction of the fixture are of pure copper or bronze of heavy-gauge sheet metal or cast, thus insuring extraordinarily long life and absolute freedom from corrosion.

The fixture is perfectly ventilated, two holes being provided in the top of the neck under the cap which permit of the passage of a current of air for cooling the lamp up alongside the lamp and receptacle and out under the cap, thus allowing the lamp to operate at normal temperature, which is productive of long life in the lamps.

All emitted light is directed to the working plane, hence the utilization factor is high. The adaptability of this unit to lamps of high candlepower makes it possible to reduce the number of units normally required to the block.

Center-Span-Suspended Unit.

It is furnished for either multiple or series circuits. When used on series circuits, it is only necessary to remove the burned-out lamp to renew the film cutout; no part of the socket or receptacle need be removed as is normally the case with series units. This facilitates lamp renewals in case of burnouts. The only change necessary for adaptation from multiple to series circuits is to change the center contact and provide each unit with a series adapter which fits on the base of the lamp; therefore, existing multiple systems may be converted at any time to the series system at a very low cost, so far as the units are concerned.



Bracket-Supported Unit.

This unit will be found particularly desirable for all classes of outdoor service, such as street lighting, railroad yards, train sheds, warehouses, etc., where efficiency, low maintenance cost, and indestructibility are factors which enter largely into the determination of the proper units to be used.

New Outlet-Box Receptacle.

To the extensive line of receptacles made by the firm of Harvey Hubbell, Incorporated, Bridgeport, Conn., there has recently been added a new outlet-box receptacle designated as No. 6103. This device provides a very simple and compact means of connecting extension cords to conduit outlets. The receptacle has the new Hubbell T-slot contacts, which make it interchangeable with 17 different types of caps. The device is readily attached by clamping the outlet-box cover between the upper and lower porcelain parts by means of a center screw which is threaded through both of them. A leather washer is included between the top porcelain and the outlet-box cover to take up any variation in either the porcelain or the cover. It also prevents the plug from rotating as the result of vibration. This method of attachment does away with the need for drilling and tapping holes in the bottom of the fitting.

These receptacles are so designed as to be used with a variety of standard outlet-boxes and conduits of various manufacturers.

Outlet-Box Receptacle.

Electric Trucks for Panama Railroad Terminal Piers.

In order to expedite the handling of cargo on the piers at Cristobal, Canal Zone, the Panama Railroad Company has placed an order for electric trucks, in the expectation of increasing the use of such equipment if the results from their operation and the developments of traffic warrant. The order placed was for four electric tractor trucks, each equipped with three trailers, to be furnished by the Buda Company of Chicago, Ill., and in addition eight trucks of different type are to be selected by the New York office of the company and sent to the Isthmus.

Each of the tractor trucks ordered is six feet long over all by 40 inches wide, has a wheel base of 42 inches, and wheel gauge of 32 inches, four wheels 16 inches in diameter, and a clearance of its working parts of 6 inches above the floor. Equipped with two sets of storage batteries, each weighs approximately 2,500 pounds. The steering radius is five feet and the

speed, with three speeds forward and three in reverse, is from one to seven miles per hour. Each tractor is rated to haul 20,000 pounds on trailers.

It is proposed in the selection of additional trucks to experiment with types equipped with small cranes, making a unit capable of lifting cargo in a sling, transporting it, and delivering it, with a minimum of dependence on human labor.

Westinghouse Oil Knife Switches.

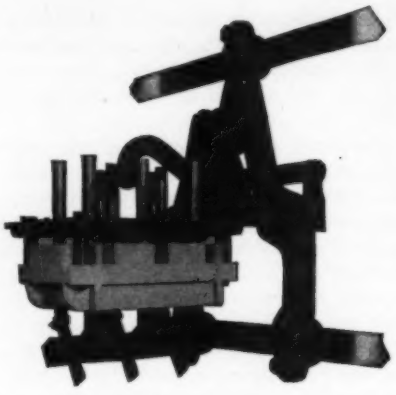
An extensive line of oil switches, known as type D, for voltages up to 7,500 has recently been announced by the Westinghouse Electric & Manufacturing Company. These switches are non-automatic and are suited for a wide range of application, being made for indoor service in various styles for switchboard mounting, direct wall mounting, and remote-control wall or

Wall-Mounted Indoor Switch, 300 Amperes, 7,500 Volts.

pipe mounting, and for outdoor service, either for pole or subway mounting.

The direct wall-mounting style is particularly adaptable to motor installations on account of the facility with which it may be mounted on any support convenient to the motor operator. The lever and handle extend outward over the oil tank so that the switch may readily be mounted against a wall, or any vertical support. The remote-control wall or pipe-mounting style allows the switch to be mounted at a convenient point away from the switchboard and operated from the switchboard or other point, as desired.

The outdoor oil switch of this type is particularly adapted for controlling lines where they enter buildings, branch feeders from the main lines, sectionalizing feeders, or any of the numerous purposes for which an outdoor type of switch may be utilized on distribution systems. The subway-type oil switch is for mounting in subways, manholes and other places where



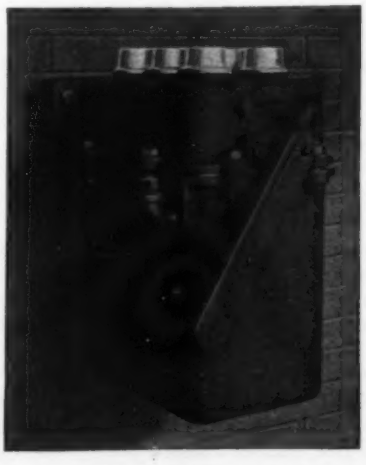
Pipe-Mounted Indoor Switch, Remote Control, 200 Amperes, 4,500 Volts.

a switch may be required to be operated submerged. The subway-type switch is made in two, three or four-pole forms for single or double throw and for voltages up to 4,500 and capacities up to 200 amperes.

Characteristic features of this type of switch are: knife-blade contacts submerged in oil; live parts carried on insulating supports, affording a high quality of permanent insulation between adjacent poles, and between the frame and live parts; small space required for mounting; accessibility of parts for purposes of inspection and repair; inclosure of all live metal parts; low first cost.

Knife-blade contacts are used as they insure the best contact for low temperature rise in a non-automatic switch. Each contact jaw has attached to it an arcing piece which takes the final break, thus preventing any burning of jaws. These arcing pieces are inexpensive and readily replaced when worn or burnt away.

With the exception of the 1,500-volt switches, the contacts are mounted on all-porcelain insulation. In switches for 7,500 volts and above, the insulation is of the pillar porcelain type, similar to that of the best accepted stand-



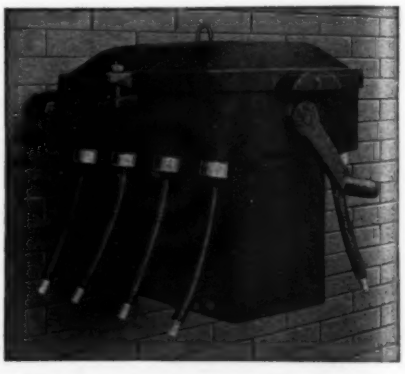
Three-Pole Subway Switch, 200 Amperes, 4,500 Volts.

ard form of circuit-breaker construction. In the 4,500-volt type up to 200 amperes, the contacts are mounted on a sturdy horizontal porcelain base, with molded porcelain barriers between all live parts. In general, this form of construction gives these switches the same characteristics ordinarily looked for only in the highest grade oil circuit-breaker construction.

The type D switches generally provide a line only paralleled by the non-automatic form of oil circuit-breakers, but by being designed particularly as switches not intended to be used automatically, they combine within their limits of capacity and voltage the highest grade of construction, insulation, etc., with a more moderate price than could apply to the non-automatic form of oil circuit-breaker.

Busch-Sulzer-Diesel Engine Day at Panama-Pacific Exposition.

An exhibit that has attracted an unusual amount of favorable attention at the San Francisco Exposition is that



Outdoor Oil Switch for Wall or Pole Mounting.

of the Busch-Sulzer Brothers-Diesel Engine Company, particularly from engineers and others interested in the economical production of power. An illustrated description of this exhibit was given in our issue of January 2, 1915. Recently there was celebrated Busch-Sulzer-Diesel Engine Day at the exposition, the ceremonies taking the form of a reception which was attended by over 500 invited guests. Lieut. G. W. Danforth, chief of the Department of Machinery, presided.

Charles V. Vogelsang, representing President Moore of the Panama-Pacific International Exposition, presented Manager W. S. Heger with a bronze medal of honor commemorating the splendid exhibit, its prompt preparation and efficient management. Lieut. Commander Woodward of the United States Navy explained the use of the Diesel engine in the navy, and Guy C. Bayley, chief electrical and mechanical engineer of the exposition, explained the theory of the engine.

An American flag was raised by a little girl as a signal, and the engine was started by three attractively attired young ladies, indicating the simplicity of its operation. Music was furnished by a band from Guatemala. The program was arranged by W. S. Heger, western manager for the Busch-Sulzer Brothers-Diesel Engine Company, who gave a brief historical sketch of the Diesel engine and its development. He said that there are at present in operation in the United States 70,000 horsepower in stationary Diesel engines. It may seem strange that the progress of the engine has been so apparently slow in this country as against its rapid strides made in Europe. The late Dr. Diesel answered this question in an address made before the American Society of Mechanical Engineers as follows:

First, coal and oil are much cheaper here than in Europe, and therefore are much more wastefully used.

Second, steam engines are much cheaper in this country, and therefore the carefully constructed Diesel is more expensive than the ordinary type of steam engine.

Third, general business profits have been so large in this country that it has not been necessary to investigate each and every expense, and it is only in the last few years that concerns have realized the importance of great economy.

The Diesel engine is manufactured in sizes from 120 to 4,000 horsepower, and can use most economically any kind of liquid fuel. It is remarkable to note that the total expense of operating this engine, 500 horsepower for one hour, is less than 68 cents for fuel and lubricating oil.

The development of the marine engine is being taken up and it will be but a short time before the company will be ready to place upon the market an economical and perfectly operating marine Diesel engine.

There has also been developed by Sulzer Brothers of Switzerland, together with the late Dr. Diesel, a Diesel engine-driven locomotive which is in operation upon one of the Prussian state railroad lines. This engine has been operating very satisfactorily and it is probably only a question of time when it will open up a field for Diesel engines of far-reaching magnitude.

The Busch-Sulzer-Diesel exhibit is located in Machinery Palace. The main engine is rated at 500 horsepower and is direct-connected to a 250-volt, 325-kilowatt, commutating-pole, direct-current generator built by the Westinghouse Electric & Manufacturing Company. Current is supplied from this set to other exhibitors using direct current.

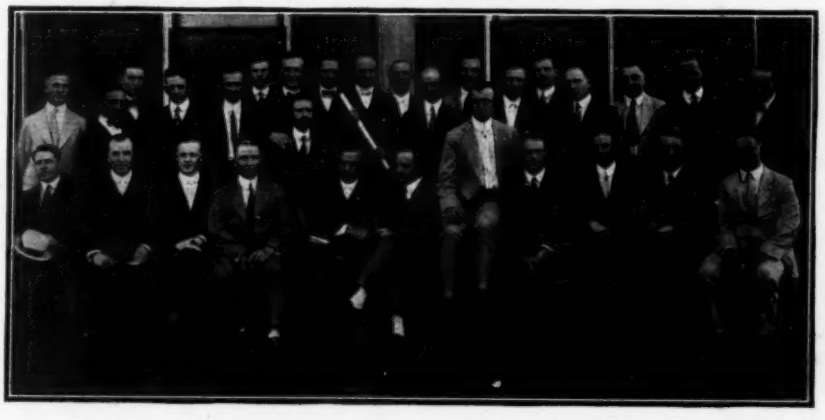
American Rotary Valve Company's Sales Convention.

The triple holiday on July 3, 4 and 5 was taken advantage of by the American Rotary Valve Company for the annual convention of its sales force. The conference took place at the company's factory at Anderson, Ind., and occupied practically the full three days. Each evening and Sunday morning was devoted to recreation.

Among the talks and papers presented were the following:

"The New Residence Vacuum Machine," by Professor W. Trinks, Carnegie Institute of Technology, Pittsburgh, Pa.; "The Road to Greater Sales," by George A. Arnold; "Jenney Motors from an Engineer's Standpoint," by William T. Hensley; "From the Shop Angle," by George T. Rosselle; "The Publicity Department," by L. L. Goding; "Productive Integrity," by William Ayer McKinney; "The Future of the American Rotary Valve Company," by R. O. Bright; "Credits and Collections," by W. H. Aurelius; "Building a Territory," by A. J. Loeb; "Co-operation Between District Offices," by Charles T. Reiss; "Wire Pulling for Business," by W. B. Haviland; "Press Drives," by Messrs. Hensley, Dudley and Immerfall; "Jenny Alternating-Current and Direct-Current Motors," by R. J. Immerfall; "Jenney Single-Phase Motors," by J. L. Hadley; "How to Win the Consulting Engineer and the Architect," by A. J. Loeb; "Rotary and Reciprocating-Type Vacuum Machines," and "Vacuum-Machine Sales Talk," by R. J. Immerfall; "The Pyschology of Salesmanship," by George A. Arnold.

There was also a general discussion of factory and branch-house motor stocks and customers' consignment stocks, led by R. O. Bright, and a general discussion of prices, discounts and terms of sale, led by George A. Arnold. One feature of the program was the one-act play in which R. J. Immerfall took the part of the salesman and L. L. Goding the part of the buyer.



Group at American Rotary Valve Company's Salesmen's Convention.

Electric Vacuum Cleaner Helps Students to Work Their Way.

An electric vacuum cleaner is in use at Purdue University to help students who wish to earn their own way through college. Some time ago Professor Alford of the university, who is interested in securing employment for students during their spare time, conceived the idea of purchasing a vacuum cleaner which could be loaned to the students, enabling them to do cleaning work for which the machine is adapted. The plan was approved by the university authorities, and the college Y. M. C. A. purchased one of the smaller-sized Western Electric vacuum cleaners.

A letter was sent to the families of the university faculty, announcing that the cleaner was available, with an operator, at 30 cents an hour. Twenty cents of this goes to the student for his services in running the machine, the remaining 10 cents going to the association for maintenance of the equipment. By a slight change in the construction of the machine, the outfit at Purdue has been made portable in two parts. The demand for the use of the machine has been steadily growing, and if it continues at its present rate, will necessitate the purchase of a second machine in the near future. The present cleaner is busy practically all of the time and earns about $20 a month.

Before sending out the cleaner, Professor Alford requested the department of electrical engineering at the university to test it for current consumption. This was done, and it was found that, at the prevailing price of current at Lafayette, Ind., where Purdue University is located, the average cost per hour for running the machine is only about three-fourths of a cent.

The manufacture of arc-lamp carbons is increasing in Spain and a quantity of Spanish carbons was exported to the United States and other countries in 1914.

Latest Approved Fittings

The electrical fittings illustrated and described in thic department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

ASBESTOS MATERIAL. — The Phillip Carey Manufacturing Company, (Lockland) Cincinnati, O.

Carey asbestos board.

Listed June 16, 1915.

FIXTURES. — The Multi-Lux Illuminating Company, 6712 Union Avenue, Cleveland, O.

Fixtures shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters have labels attached.

Listed June 9, 1915.

FIXTURE CROWFOOT. — The Cleveland Electric Company, 2355 Lakeside Avenue, Cleveland, O.

Fixture crowfoot, made of fine-grained cast iron with set screw and two flat steel springs, for securing ⅛-inch-size pipe or chain fixture stem. P-U.

Listed June 24, 1915.

HEATERS, Electric.—Globe Stove & Range Company, Kokomo, Ind.

Globe electric heaters, up to 10 kilowatts, 110-220 volts. Porcelain-enamel ranges, hot plates and ovens.

Listed June 24, 1915.

HEATERS, Electric, Stand for Pressing Iron.—Hotpoint Electric Heating Company, Ontario, Cal.

Nickel-plated steel stand made of two pieces of formed steel riveted together. Hotpoint catalog No. C. S. 1.

Standard only for pressing irons consuming 660 watts or less.

Listed July 2, 1915.

INCLOSED SWITCH. — General Electric Company, Schenectady, N. Y.

Quick-make-and-break induction-motor starting switch, equipped with time-element plugs designed to afford protection to motor against overloads maintained for longer than predetermined periods. Inclosed in metal case and designed for manual operation without opening case.

Type CR-1038, 5 horsepower, 110-250 volts; 3 horsepower, 440-550 volts.

Listed June 25, 1915.

INCLOSED SWITCHES.—Metropolitan Engineering Company, 1238 Atlantic Avenue, Brooklyn, N. Y.

Three-pole, solid-neutral service-entrance switches with cutout bases for plug fuses, inclosed in metal cases and designed with fixed terminals and contacts, and a spring-operated porcelain base with special blades traveling on horizontal guides.

M. E. Co., 0-30 amperes, 125-250 volts, catalog No. 117, with meter-testing block, catalog No. 118.

Listed June 30, 1915.

LAMP ADJUSTER.—Indispensable Manufacturing Company, 201 Flatiron Building, San Francisco, Cal.

Adjuster forming a part of a chain fixture, consisting of a standard key socket, a length of portable cord, and a spring-controlled drum with pull-chain ratchet. The ends of the portable cord are attached and connected in circuit through insulated brushes and contact rings. A two-piece, formed brass shell supports and incloses the operating parts. The portable cord is guided through a large hole by composition roller.

Listed June 8, 1915.

LIGHTNING RODS.—Des Moines Lightning Rod Company, 772 Sixth Avenue, Des Moines, Iowa.

Listed July 2, 1915.

MOLDING.—Columbia Metal Hose Works. Incorporated, Cottage and Orient Streets, Bayonne, N. J.

C. A. C. metal molding.

Listed July 2, 1915.

MOLDING FITTINGS.—W. E. Bible & Company, Rawlins, Wyo.

Metal molding clip.

A clip for holding wire in channel of metal molding before capping is put on.

Listed June 24, 1915.

PANELBOARDS. — Electric Apparatus Company, 127 South Green Street, Chicago, Ill.

Panelboards shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters have labels attached.

Listed June 16, 1915.

PNEUMATIC CLEANER. — Invincible Manufacturing Company, Farmers Bank Building, Pittsburgh, Pa.

Invincible electric renovator. A series-wound motor direct-connected to a suction fan with dust receptable and other attachments; mounted on a wheeled base. Motor designed for 100 or 220 volts, alternating-current or direct-current. For cleaning purposes in households, hotels and office buildings.

Suitable for use when installed in connection with specially wired supply circuits approved by the Inspection Department having jurisdiction.

This machine should not be used on ordinary lighting circuits.

Listed June 14, 1915.

PORTABLE AIR PUMP. — Mayo Manufacturing Company, 54 East Eighteenth Street, Chicago, Ill.

This device consists of a two-cylinder air compressor driven by a small motor with a chain transmission, and controlled by a snap switch all mounted on a portable truck.

110 or 220 volts direct or alternating current. 0.25 horsepower.

Listed June 18, 1915.

SOCKETS, Weatherproof. — C. P. Lovering Company, Corner North and Water Streets, East Cambridge, Mass.

Molded mica composition weatherproof sockets.

Mica composition, 660 watts, 600 volts, catalog No. 43310.

Mica composition provided with connecting ring for connections to ⅜-inch pipe, 250 watts, 250 volts, catalog No. 43312.

Black composition, 660 watts, 600 volts, catalog No. 60666.

Listed June 24, 1915.

SWITCHES, Automatic.—Owen T. Snyder & Company, Lynn and Ludlow Streets, Columbus, O.

Safety elevator door switch and threshold light.

An inclosed duplex series spring-opened switch automatically operated by elevator door. One side connected in series with car controller so that car cannot be started until door is properly closed. The other side is connected in series with threshold fitting for illuminating threshold of car when door is open.

Listed June 8, 1915.

SWITCHES, Inclosed. — Berry, Skinner & Company, 78 Upper Thames Street, London, England.

Three pole, double-break, spring-actuated, plunger-type switches and cutout bases for standard cartridge-inclosed fuses. Inclosed in metal cases and designed for manual operation without opening cases.

Adanac, 20 amperes, 250 volts.

Listed June 7, 1915.

SWITCHES, Knife. — Metropolitan Engineering Company, 1238 Atlantic Avenue, Brooklyn, N. Y.

A three-pole switch, the blades consisting of cartridge-inclosed fuses mounted on a hinged cover plate with handle whereby all can be withdrawn simultaneously when device is used as a switch. 100 amperes, 125-250 volts, catalog No. 155.

Listed June 10, 1915.

SWITCHES, Push-Button, Flush.—Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins.

Single-pole, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 2701.

Three-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 2703.

Listed June 15, 1915.

Current Electrical News

ATLANTIC STATES.

PITTSFIELD, MASS. — The committee on fuel and street lights has voted to extend the lighting system on North Street from the present terminus at White Terrace as far northward as Wahconah Street. This will require seven lamps, of the nitrogen type.

BINGHAMTON, N. Y.—The ordinance, passed over the mayor's veto by the council, authorizing the sale of municipal lighting bonds, has been repealed.

FEDERALSBURG, MD. — The Eastern Shore Gas and Electric Company, organized under the laws of Delaware, has made a settlement with the stockholders of the Federalsburg Electric Light Company, to assume control of this plant, together with those of Laurel, Salisbury, Cambridge and Georgetown. This new concern is controlled by Day & Zimmerman, Philadelphia engineers, and backed by the banking houses of Brown Brothers and Company and Frazier and Company of Philadelphia.

LEBANON, VA. — Arrangements have been completed for construction and equipment of an electric light and power plant by a group of Lebanon citizens. The town is not on a railroad, though in a rich agricultural section. Provision will be made in connection with the electric light plant for an ice factory.

COLUMBIA, S. C.—State Hospital for Insane has plans for power house. Address J. R. Rutherford, superintendent.

NORTH CENTRAL STATES.

DAYTON, O.—A transaction involving the consolidation of the electric light and power interests in several Kansas cities, including Emporia, Lawrence and Parsons, and the plants at Union City, Ind., and Sidney, O., as well, is in progress of completion here, Albert Emanuel, a local attorney, being in charge of the deal, on behalf of New York interests. Dayton capitalists will, it is understood, furnish about half of the $2,000,000 involved.

YOUNGSTOWN, O.—On account of the failure of the city to extend its recently completed ornamental street-lighting system on the request of some of the property owners in the business district, several of them are reported to be planning to install their own lighting plants, in connection with ambitious exterior lighting arrangements. The proprietor of the Albany Hotel, at South Champion and East Front Streets, has stated his intention of doing this, and it is understood that other property owner will follow his example.

BROOKVILLE, IND.—The Brookville Electric Light Company has petitioned the Public Service Commission for authority to issue bonds in the sum of $10,000. The proceeds from the sale of the bonds are to be used for improvements.

GOSHEN, IND.—The Hanks Electric Company has petitioned the Public Service Commission for authority to purchase the Home Electric Company, of Wakarusa.

LAGRANGE, IND.—The Council is planning ways and means to establish a municipal electric light plant. Address city clerk.

BELOIT, WIS.—Plans have been prepared for an ornamental lighting system for this city. There will be 94 ornamental standards mounted with tungsten lamps of 600 candlepower. Current will be furnished through underground wires. The estimated cost of the system is $8,000. F. W. Dupke, 439 East Grand Avenue, is chairman of the committee in charge of the work.

NEW RICHMOND, WIS. — This village has voted to establish a white way.

ELK RIVER, MINN.—Articles of incorporation have been filed by the Elk River Power and Light Company. Capitalization, $100,000. The incorporators are F. D. Waterman, Eva Waterman and M. E. Waterman.

MINNESOTA LAKE, MINN.—A power line is to be built to Mapleton from here. The contract for the supplies, amounting to $7,658, has been awarded to the Electrical Appliance Company of Chicago.

MONTEVIDEO, MINN.—The local electric light and power plant has gone into the hands of the Northwestern Light and Power Company.

VIRGINIA, MINN. — Electrical power is being used here for the first time to operate a rock crusher which is under contract to furnish 2,000 cubic yards of rock to the city. The machine is being operated by J. C. McCusick. It was found cheaper to operate it by current than by gasoline.

ALBANY, IOWA. — Franchise has been voted to the Clinton Gas and Electric Company.

MARSHALLTOWN, IOWA—The Board of Supervisors has granted permission to the Iowa Railway and Light Company to build a transmission line from LeGrande to Gilman.

ST. JOSEPH, MO.—The electric light committee recommended $75,000 for duplicating the present plant and extending it to furnish lights for all the streets, including the white way, and providing ample facilities for making boulevard lighting extensions as they might be needed.

KINGSTON, N. D.—Additional improvements will be made to the electric light plant. Address F. I. Sutton, mayor.

EVEREST, KANS.—The citizens of Everest have authorized a bond issue of $8,000 for municipal electric lights. A transmission line will probably be run from Hiawatha. M.

LARNED, KANS.—The Council is planning to install a white way. Address City Attorney Finney.

REPUBLIC, KANS.—The sum of $6,500 in bonds has been voted for electric lights. The electricity will be furnished by the Concordia plant, and connection will be made from Courtland. Address mayor.

SOUTH CENTRAL STATES.

FULLERTON, KY. — An electric light and ice plant is to be constructed by John Davis, who, it is stated, will convert the Fullerton Canning Company plant into a lighting plant.

HAZARD, KY.—Proposals for construction of a large central electric power plant to supply surrounding coal mines with current are being developed by E. C. Lilly, of Bluefield, W. Va., and D. Terpstra, of Norton Va.

JENKINS, KY.—A franchise for construction and operation of an electright light plant is a recent development. The mayor is in touch with the situation.

LEXINGTON, KY.—Plans for the white way system are rapidly being perfected by the Board of Commerce, and Harry S. Brower, president, announced that they would be submitted to an engineer experienced in these installations before work was actually begun. The system will be composed of 97 ornamental standards, each equipped with two type C Mazda lamps, the installation cost to be borne by property owners; the city to attend to the rest.

RUSH, ARK.—John Conness Shepherd is planning to put in an electric plant to supply his own properties with light; possibly to furnish light for the entire village. This is one of the largest mining camps in the field.

KENEFICK, OKLA. — The city council is considering the proposition of installing an electric light plant. Address mayor.

AUSTIN, TEX.—Part of the $125,000 which the Legislature appropriated recently for repairing the State Capitol will be used for constructing a new power plant and rewiring the entire building.

CORPUS CHRISTI, TEX.—The city council has called an election for August 10 to vote on the proposition of granting a franchise to J. H. Caswell and associates for the construction of an interurban electric railway over certain streets. D.

HARRISBURG, TEX.—The new cement mill which the Texas Portland Cement Company will build here will be electrically equipped. The plant will have an annual capacity of about 4000,000 barrels of cement. D.

WESTERN STATES.

GLASGOW, MONT.—In the immediate future this city will vote on the proposition of issuing bonds in the sum of $20,000 to be used in installting a 225-horsepower oil engine and a 160-kilowatt generator as an adjunct to the municipal water system. O.

ROUNDUP, MONT.—Reported the city council has passed a bill ordering the immediate installation of an ornamental lighting system in this city. The installation will consist of 100 lamp posts with cluster lights. Engineer C. A. Renshaw, who prepared the plans for the improvement, estimates the cost at $100 per post. Understood bids for the material and installation will be received by the city clerk at an early date. O.

ROSWELL, N. M.—The Pecos Valley Investment Company's power house at South Spring was destroyed by fire recently.

BONNERS FERRY, IDAHO.—The city council has decided to install an electrically operated pumping plant as an adjunct to the municipal water system. The installation will be made by the Bonner Light and Water Company. O.

RICHLAND, IDAHO.—According to Stanley G. Smith, representing a large power corporation which recently acquired the Oxbow plant on the Snake River, Eagle Valley and the small towns in this territory, are to be served with electrical energy at an early date. The company is petitioning for franchises at this time and it is understood, active construction of the transmission lines and various substations is but a matter of a few months. O.

WARDNER, IDAHO.—Councilmen Seaman, Struthers and Loer have been appointed by the mayor and city council to investigate the feasibility of this city installing and equipping a municipal lighting plant. O.

SEWARD, ALASKA. — A petition for a light and power franchise to serve this city with electric current for both light and power has been presented to the city council by J. C. Murray and J. P. Mantell. The petitioners state active construction will be ordered as soon as the franchise is granted. O.

CENTRALIA, WASH. — Application has been made to the Commissioners of Lewis County, by H. G. Fleischhauer, for a franchise to construct power lines over certain roads.

SEATTLE, WASH.—The Port of Seattle Commission, Central Building, C. E. Remsberg, chairman, will receive bids until August 4 for two electric freight elevators in the new fruit storage warehouse. O.

SPRAGUE, WASH.—The city council is negotiating with the Washington Water Power Company of Spokane relative to the installation of a new electric pumping plant as an addition to the local water system. Understood the plant will be installed this summer.

SUMNER, WASH.—The city council is working out details regarding the installation of an up-to-date street lighting system, to be placed this summer. Current will be purchased from either the Puget Sound Traction, Light and Power Company or the Tacoma municipal plant. O.

WALLA WALLA, WASH. — According to City Commissioner H. H. Crapton, cluster lights will be installed on Second Street, from Stahl Avenue to the Northern Pacific depot, some time this summer. The proposition of furnishing current has been taken up with Manager C. S. Walters, of the Pacific Power and Light Company.

WENATCHEE, WASH.—The local plant of the Wenatchee Valley Gas and Electric Company, here, recently sustained serious loss, totaling several thousand dollars, when a mud slide demolished a portion of the power plant and carried the generating machinery and other electrical equipment into the river. Immediate steps will be taken to repair the damage and rebuild the plant. O.

CROCKETT, CAL. — The recent municipal election for the formation of a public lighting district here carried.

LOS ANGELES, CAL. — "Greater Culver City," is shortly to have an electrolier lighting system that will harmonize with the present illuminating scheme of Culver City proper.

SACRAMENTO, CAL.—The Great Western Power Company has filed an application with the state corporation commission for an order preliminary to the issue of a certificate of convenience and necessity for the exercise of franchise rights to be granted by Plumas County and for authority to build an electric power line in that county. The franchise applied for is to be sold September 9, 1915.

SANTA ANA, CAL.—An election will be held on August 10 to submit to voters the proposition for the organization of the Buena Park lighting district.

SANTA BARBARA, CAL. — Plans are under consideration for the installation of an ornamental lighting system on West Boulevard, which it is estimated would cost about $4,000.

STOCKTON, CAL. — Residents of the town of Ripon, which is not incorporated, have filed a petition with the county supervisors applying for permission to organize a highway lighting district.

TULARE, CAL.—The Mt. Whitney Power and Electric Company, which recently purchased the Tulare County Power Company, is extending its lines ten blocks in West Tulare, and has surveyors at work determining which lines of the Tulare County company's system it will retain when it takes over the business on August 1.

PROPOSALS.

SUBMARINE CABLE.—Sealed proposals will be received at the office of lighthouse inspector, Buffalo, N. Y., on July 26 for furnishing approximately 6,900 feet of submarine electric cable. Address lighthouse inspector.

SIOUX FALLS, S. D.—Bids will be received until July 26, on the alternative installation of pumping machinery, either one 5,000,000-gallon vertical triple-expansion steam pumping engine, or two units, each consisting of an oil engine operating a 40-kilowatt generator and a 1,500-gallon per minute vertical triplex pump. Address W. C. Leyse, city auditor.

ELECTRIC DUMBWAITER. — Sealed proposals will be opened in the office of the Supervising Architect, August 16, 1915, for the installation of an electric push-button dumbwaiter in the extension, United States postoffice and courthouse, Detroit, Mich., in accordance with the drawing and specification, copies of which may be had at the office of the Supervising Architect, Washington, D. C.

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

ELECTRIC TRAIN LIGHTING. NO. 17,470.—An American consular officer in a British possession writes that a demand is being made that the system for lighting passenger coaches on the state railways by gas be changed to electricity in the interest of the traveling public. The consular officer transmits the name and address of an official of the railroad who may be addressed relative to this opportunity.

ELECTRIC METERS. NO. 17,478.—An American consular officer in Canada reports that an electric power company in his district is in need of meter clocks which will automatically charge energy to the consumer at the regular lighting rate during the rush or peak period and at a reduced rate for cooking purposes at other times. Quotations should be made c. i. f. destination. The Canadian customs tariff on electric meter clocks is 35 per cent ad valorem.

TELEPHONE MATERIALS.—Mr. Kwan Po Pin, manager, Chinese Telegraph Supply Department, No. 27 Markham Road, Shanghai, China, has invited tenders for telephone material and printing machinery. Bids will be received until August 20, 1915. Specifications, requisition sheets, and other information may be examined at the Bureau of Foreign and Domestic Commerce or its branch offices.

COPPER AND STEEL WIRE. NO. 17,553.—An American consular officer in England transmits a report relative to a market for copper and steel wire. A copy of his report may be had on application to the Bureau of Foreign and Domestic Commerce or its branch offices.

CABLES, COPPER WIRE, ETC. NO. 17,554.—An American consular officer in Norway transmits a report relative to an opportunity for the sale of vulcanized cables, copper wire,. electrical wire for bells and house telephone cables. A copy of this report may be had on application to the Bureau of Foreign and Domestic Commerce or its branch offices.

ELECTRICAL SUPPLIES. No. 17,559.—The commercial agent of the Bureau of Foreign and Domestic Commerce in New York has been informed that an Italian firm desires to represent American manufacturers and exporters of electrical apparatus, electric light fixtures, and electrical appliances. Catalogs containing the articles desired may be seen at the New York office of the Bureau. The firm desires to receive samples, catalogs, and full information relative to prices, etc.

NEW PUBLICATIONS.

BUILDING CONSTRUCTION. — An attractive book showing 31 plates of office buildings, educational institutions, industrial plans, warehouses, power stations, etc., constructed by Stone & Webster Engineering Corporation, Boston, Mass., has been issued by the company. Some of these structures are illustrated with several views depicting the progress of the work.

Condensed data on most of the buildings are given.

COKING OF COAL.—Bulletin 79 of the University of Illinois Experiment Station has been issued under the title "The Coking of Coal at Low Temperatures with Special Reference to the Properties and Composition of the Products." This report by S. W. Parr and H. L. Olin gives valuable observations on the by-products of modern coke making.

LATIN AMERICAN MONETARY SYSTEMS AND EXCHANGE CONDITIONS.—A 31-page booklet with this title has been prepared by Joseph T. Cosby, of the National City Bank of New York, and is being distributed by the Foreign Department of this bank. It gives an explanation and data on the monetary system of 17 Latin American countries, and also gives the current state of exchange between the United States and these countries. Thus it forms a valuable compendium for those interested in developing export trade with the Latin countries south of us.

NEW INCORPORATIONS.

FRANKLIN PARK, ILL.—The Gite Electrical Company has been incorporated with a capital of $16,000, by A. B. Kircheff, James O'Malley and John Early.

JACKSON, ALA.—The Jackson Electric Company has been incorporated with a capital of $15,000, by R. V. West and others, to operate electric plant, ice plant, etc.

BROOKLYN, N. Y.—D. K. Electrical Contracting & Fixture Company, Incorporated. Capital, $5,000. Incorporators: Sam Kuslansky, Rachael Kuslansky and David Davidson.

NEW YORK, N. Y.—E. H. Tiffany & Company, Incorporated; electrical apparatus, etc. Capital, $25,000. Incorporators: E. H. Tiffany, J. W. Stone and Glenn M. Congdon.

NORFOLK, VA.—Virginia Electric Welding Company, Incorporated. Capital, $2,400 to $15,000. Officers of the company are: J. A. Ridgwell, president; F. Tonnemacher, vice-president; William Benseler, secretary and treasurer.

NEW YORK, N. Y.—The Great Eastern Electric Company has been incorporated to deal in machinery, engines, tools, appliances, etc. Capital, $8,000. Incorporators, A. Hallberg, G. Hallberg, R. Lundin.

VERNON, IND.—The Vernon Hydro-Electric Company has been organized to manufacture and sell electricity. Capital, $1,000. The incorporators are George C. Ale, F. T. Semon and Nicholas Eitel.

NEW YORK, N. Y.—The American Magnet Power Company, Incorporated; to develop electrical apparatus, etc. Capital, $200,000. Incorporators: Thomas J. Scherer, William T. Leverenz and Charles Wintrowd, all of Danville, Ill.

NEWARK, N. J.—The Essex Electric Company has been incorporated with a capital of $125,000, to manufacture electrical appliances. The incorporators are: Job H. Lippincott, Thomas S. Woodruff, William A. Smith, all of New York City.

HIGHLAND SPRINGS, VA.—The Fairfield Electric Light and Power Company has been incorporated with a capital of $5,000, as an electric light and power business. The incorporators are G. T. Collins, president; S. M. O'Bannon, secretary, both of Highland Springs.

SHELBYVILLE, TENN. — The People's Power Company has filed its charter with the county register. The authorized capital stock of the company is $25,000. Capt. J. E. Huffman, E. C. Huffman, A. B. McGill, Ernest Caldwell and Thomas N. Greer are the incorporators. The company will do a general electrical business in the state of Tennessee.

FINANCIAL NOTES.

United Gas and Electric Corporation has purchased and surrendered to the Fidelity Trust Company, trustee, $1,000,000 of its $5,500,000 three-year six-per-cent notes, for cancellation. By this, United Gas & Electric anticipates the retirement of $500,000 of the notes on July 1, 1916, and $500,000 on January 1, 1917, as provided in the indenture under which the notes were issued last April.

Edwin Hanson, A. Kingman, T. B. MacCauley, S. J. Moore and E. Mackay Edgar have been appointed a committee for the protection of the holders of the $10,000,000 first-mortgage 30-year five-per-cent bonds of the Mexican Northern Power Company, on which interest was defaulted some time ago. Depository for the bonds is the National Trust Company, Limited, of Montreal and Toronto, and all bonds must be deposited by October 1, 1915.

Shawinigan Water & Power Company will issue $1,237,500 of capital stock to stockholders, at par, in the ratio of one share of the new stock to ten shares of the old stock. Owing to financial conditions, the stockholders are given the right, good until June 30, 1916, of subscribing for the stock at 105, instead of par. Subscription rights at par expire August 30. At 114, the price at which the stock has been selling, immediate rights would have a value of $1.27 a share, and the deferred rights a value of 82 cents a share.

Dividends.

	Term	Rate	Payable	
Am. Rys. pf.	Q	1.75%	Aug.	14
Automatic Elec.	Q	1 %	Aug.	1
Bangor Ry. & Elec. com.	—	0.5 %	Aug.	2
Col. Ry., Pr. & Lt.	Q	1.25%	Aug.	2
Col. Ry., Pr. & Lt. pf. "B"	Q	1.25%	Aug.	2
Commonwealth Pr., Ry. & Lt.	Q	1 %	Aug.	2
Commonwealth Pr., Ry. & Lt., pf.	Q	1.5 %	Aug.	2
Elec. Bond & Share	Q	2 %	July	15
Elec. Bond & Share pf.	Q	1.5 %	Aug.	1
Ft. Worth Pr. & Lt. pf.	Q	1.75%	Aug.	1
Grand Rapids Ry. pf.	Q	1.25%	Aug.	2
Illum. & Pr. Sec. Corp. pf.	Q	1.75%	Aug.	16
Lewiston, Augusta & Waterville St. Ry. pf.	Q	1.5 %	Aug.	2
Montreal Rys.	Q	2.5 %	Aug.	2
Phila. Co. pf.	S	2.5 %	Sept.	1
West Penn. Rys. pf.	Q	1.25%	Aug.	2

Reports of Earnings.

WESTERN UNION.

The Western Union Telegraph Company has issued its statement for the six months ended June 30, 1915 (June estimated), as follows:

	1915	1914
Total revenue	$24,019,260	$22,466,578
Maintenance and depreciation	3,878,138	3,511,571
Other expenses	15,481,607	16,186,556
Balance	$4,659,515	$2,768,451
Bond interest	668,600	668,625
Surplus	$3,990,915	$2,099,826

WESTERN POWER COMPANY.

	1915	1914
June gross	$232,820	$213,354
Net after taxes	165,801	144,014
Surplus after charges	77,401	63,334

EDISON COMPANY OF BOSTON.

	1915	1914
June gross	$ 559,291	$ 518,341
12 months gross	7,429,124	7,008,288

Increase during June is equal to 7.9 per cent, the largest percentage of increase since last September, while twelve months gross made a new high record, and represented a gain of 6 per cent.

PERSONAL MENTION.

MR. E. BURT FENTON, until recently advertising manager of the Sandusky (O.) Gas and Electric Company, has been appointed manager of a new publicity department for the various properties operated by W. S. Barstow and Company, New York.

MR. W. S. BARSTOW has been elected president of the Rutland (Vt.) Railway, Light and Power Company. Mr. Barstow succeeds as president Mr. Herbert Nash, Jr., who retains his directorship. Vice-president B. T. Burt, who came to Rutland a few months ago, is to have the entire management of the concern, assuming the dutes which are to be relinquished by Mr. I. M. Frost, who severs his connection with the Rutland company August 1. Mr. Burt before coming to Vermont was connected with several big electric power enterprises in the South.

MR. H. A. STEVENSON, who resigned recently as assistant electrical engineer of the Underwriters' Laboratories, Incorporated, Chicago, has been appointed sales engineer of the Starrett Electric Company, 215 West Superior Street, Chicago. Mr. Stevenson is well known through his connection with the Laboratories, and for his earlier work in the educational field as head of the electrical department of the Columbus Trade School. He has taken an active part in the promotion of high standards for electrical fittings and construction. He is an active Jovian, and has taken a prominent part in many affairs of the Jovian Order.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	July 19	July 12
Amer. Tel. & Tel. (New York)	121	119¾
Commonwealth Edison (Chicago)	134½	135
Edison Electric Illuminating (Boston)	235	237
Electric Storage Battery common (Philadelphia)	53	52
Electric Storage Battery preferred (Philadelphia)	53	52
General Electric (New York)	166¾	161½
Kings County Electric (New York)	119	119
Massachusetts Electric common (Boston)	5½	5
Massachusetts Electric preferred (Boston)	33½	34½
National Carbon common (Chicago)	130½	
National Carbon preferred (Chicago)	120	120
New England Telephone (Boston)	132	131
Philadelphia Electric (Philadelphia)	23¾	23¾
Postal Telegraph and Cables common (New York)	70	75¾
Postal Telegraph and Cables preferred (New York)	64	64
Western Union (New York)	69½	65¾
Westinghouse common (New York)	103½	97
Westinghouse preferred (New York)	120	122

OBITUARY.

MR. WILLIAM G. DEACON, managing editor of the *Public Service Magazine*, of Chicago, and widely known as a public utility expert, died on July 16, in Minneapolis. He was formerly a newspaper man in Chicago, St. Paul, and Minneapolis.

MR. WILLIAM H. GERRISH, state smoke inspector for the Massachusetts Gas and Electric Light Commission, died at Malden, Mass., July 15. He was 49 years old, a native of Lowell and a graduate of Massachusetts Institute of Technology. He was appointed to his position five years ago, and was the first holder of that office under the commission.

MR. LOUIS F. BECKERT, a salesman with the Westinghouse Electric and Manufacturing Company, died suddenly July 7 at his residence in Pittsburgh, Pa. Death was due to typhoid fever. Mr. Beckert was born in Pittsburgh in 1886. He received his early training in Bellevue Public Schools and graduated from the Allegheny High School with honors in 1903. In the fall of that year, Mr. Beckert entered Penn State College, graduating in 1907. While in college he made many friends and was a member of the Sigma Nu fraternity. Upon the completion of his college course, he entered the employ of the Westinghouse Electric and Manufacturing Company as an engineering apprentice. After completing his course he accepted a position in the railway equipment division of the railway and lighting department, in which department he remained until his death.

PROFESSOR FREDERICK PRIME, of Girard College, Philadelphia, died on Wednesday, July 14, at Chelsea, Atlantic City, N. J., in his seventieth year. He was born in Philadelphia, and after serving for a year in the civil war attended Columbia University, from which he was graduated in 1865. Professor Prime later received degrees from the Royal School of Mines at Freiberg and Lafayette College. From 1869 until 1870 he was an assistant in assaying at Columbia, and for the next nine years was professor of geology and metallurgy at Lafayette. He was also president of several iron and electrical companies in Alabama and Pennsylvania and from 1891 until 1893 was president of the Edison Electric Light Company of Philadelphia. In 1895 he became professor of natural history at Girard College. Professor Prime was a secretary of the American Philosophical Society from 1897 until 1900

DATES AHEAD.

American Association for the Advancement of Science. Summer meeting; San Francisco, Cal., August 2-7. Secretary, L. O. Howard, Washington, D. C.

International Association of Municipal Electricians. Annual meeting, Gibson Hotel, Cincinnati, O., August 24-27. Secretary, C. R. George, Houston, Tex.

Indiana Electric Light Association. Annual convention, Hotel Deming, Terre Haute, Ind., September 8-10. Secretary, T. Donahue, La Fayette, Ind.

Pennsylvania Electric Association. Annual convention. Bedford Springs, Pa., September 8-10. Secretary, H. N. Mueller, 435 Sixth Avenue, Pittsburgh, Pa.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Statler, Detroit, Mich., September 8-11. Secretary, W. T. Snyder, McKeesport, Pa.

Northwest Section, National Electric Light Association. Annual convention, Portland, Ore., September 8-11. Secretary, N. W. Brockett, Seattle, Wash.

Electrical Supply Jobbers' Association. Quarterly meeting, Clifton Hotel, Niagara Falls, Ont., September 14-16. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

New England Section, National Electric Light Association. Annual convention, Mt. Kineo House, Kineo, Me., September 14-17. Secretary, O. A. Bursiel, 149 Tremont Street, Boston, Mass.

American Institute of Electrical Engineers. Panama-Pacific convention, San Francisco, Cal., September 16-18. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York, N. Y.

American Electrochemical Society. Twenty-eighth general meeting, San Francisco, Cal., September 16-18. Secretary, Joseph W. Richards, South Bethlehem, Pa.

Illuminating Engineering Society. Annual convention, New Willard Hotel, Washington, D. C., September 20-23. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York, N. Y.

International Engineering Congress, San Francisco, Cal., September 20-25. Executive secretary, E. J. Dupuy, Foxcroft Building, San Francisco, Cal.

Telephone Pioneers of America. Annual meeting, San Francisco, Cal., September 21-23. Secretary, R. H. Starrett, 15 Dey Street, New York, N. Y.

Southeastern Section, National Electric Light Association. Annual convention, Grove Park Inn, Asheville, N. C., September 22-24. Secretary, George H. Wygant, Tampa, Fla.

Colorado Electric Light, Power and Railway Association. Thirteenth annual convention, Glenwood Springs, Colo., September 23, 24 and 25. Secretary, Thomas F. Kennedy, 900 Fifteenth Street, Denver, Colo.

With the Electrical Manufacturers

The King Electric & Manufacturing Company, Cleveland, O., announces that owing to increased business it is moving to larger quarters at 10514 Dupont Avenue.

The Fargo Manufacturing Company, Incorporated, Poughkeepsie, N. Y., is publishing new catalogs describing its connecting devices and electrical and mechanical appliances. Copies of these bulletins will be sent to those interested upon request.

The Usona Manufacturing Company, Incorported, 100 Hudson Street, New York City, has ready for distribution a condensed booklet on its pocket and tubular Kwick-lite electric flashlights. About 20 of these are illustrated, also dry-cell batteries and Mazda lamps.

The Lackawanna Mills and **The Scranton Button Company,** Scranton, Pa., are giving their eighteenth annual outing for their employees on July 24. The event this year is an excursion and all-day picnic at Lake Lodore. As usual a great variety of sports and athletic contests with abundant refreshments and amusements are conspicuous features of the program.

Queen-Gray Company, Philadelphia, Pa., successor to the old and well known instrument firm of Queen & Company, has issued Bulltein E6, devoted to portable testing sets and instruments for the maintenance of lines and cables. Among the instruments illustrated and described are the following: Several decade and dial-type portable testing sets, lamp-testing meter, inductive fault finder, several types of ohmmeters, portable galvanometers, galvanometer shunts, choride of silver testing batteries, etc. Each type of instrument is briefly described and its special line of utility pointed out.

W. C. Sterling & Son Company, Monroe, Mich., one of the largest dealers in cedar poles, posts, ties, etc., has purchased a large, valuable site at Bay City, Mich., and will move its headquarters and main distributing yard to this point as soon as the property is improved with new dockage, sidetracks, etc. The new yard fronts 260 feet and has two adjoining slips on the river, and runs back about 1,000 feet to the tracks of the Michigan Central Railway, thus having exceptionally good shipping facilities both by water and rail. When completed this will be probably the largest cedar-distributing yard in Michigan.

Westinghouse, Church, Kerr and Company, 30 Wall Street, New York City, engineers and contractors, have prepared an interesting group photograph, designated as the "W. C. K. City," showing a multitude of structures that the firm designed and constructed in their entiretv. The total cost of the buildings, shops and works illustrated was over $50,000,000 and their aggregate area under roof totaled over 56,000,000 square feet. Among the buildings are power houses, railroad depots, shops and various industrial works, office and public buildings, etc. The structures shown do not represent all the work done by the firm, as in many large undertakings the W. C. K. organization has carried on only part of the work.

Mutual Electric & Machine Company, Wheeling, W. V., is establishing its principal offices and factory at the corner of Fort Street and Fourth Avenue, Detroit, Mich. The company's rapidly expanding "Bull Dog" switch and panelboard departments and the character of its business connections makes a more central and metropolitan location desirable. This is particularly the case with the rapidly growing automobile specialty departments of the company's business. The manufacturing facilities will be greatly increased, as the new factory is strictly modern in construction and appointments. It is four stories high and well located on a main thoroughfare and within a few blocks of the business district.

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has issued a highly interesting and very attractively illustrated book of 72 pages entitled "Results of Electrification." It gives a condensed summary of the many steam-railroad electrifications carried out by the Westinghouse company. Among the installations briefly described are the Hoosac Tunnel, St. Clair Tunnel, Pennsylvania Railroad, New York City Terminal, New York, New Haven and Hartford Railroad, Pennsylvania Railroad Paolo Division at Philadelphia, Long Island Railroad, New York, Westchester & Boston Railway, Italian State Railways, Giovi Division, Norfolk & Western Railway Elkhorn Grade, Niagara Junction Railway, Spokane & Inland Empire Railroad, Oakland, Antioch & Eastern Railway, Piedmont & Northern Lines, Southern Pacific Railway, Erie Railroad Rochester Division, Lackawanna & Wyoming Valley Railroad, Rock Island & Southern Railway, Maryland Electric Railways, Visalia Electric Railroad. These different installations represent electrifications under the greatly varying conditions existing in tunnels, main terminals, main trunk lines, mountain grades, suburban terminals, classification yards and general switching service, freight-interchange service, single-track systems, branch lines and feeder systems, and fully demonstrate the practicability of electric operation for any railroad service. The book contains a multitude of fine illustrations of these systems, together with the salient data of each. A summarized table of the electrified steam railroads of the country is given; this shows that out of a total of 2,255 miles of electrified trackage the Westinghouse company has equipped 1,549 miles, and of a total of 280 electric locomotives used on these lines it has furnished 178. The Westinghouse Electric and Manufacturing Company has also issued the first of a periodical series of "Westinghouse Electrification Data." No. 1 of this series is devoted to electric-locomotive characteristics. This is a general and illustrated discussion of the subject, supplemented by data on the comparative cost of steam and electric-locomotive maintenance, and by data on the splendid performance of the electric locomotives in the Pennsylvania Railroad's New York City terminal service.

Record of Electrical Patents

Issued by the United States Patent Office, July 6, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,144,997. **Semi-Automatic Exchange System.** A. M. Bullard, assignor to Western Electric Co., Chicago, Ill. Telephone set of keys switched onto any one of a number of senders.

1,144,998. **Magnetic Engine.** R. Burnham, assignor to Gebhardt Meter Co., Chicago, Ill. Movement of float in sealed chamber of fluid meter transmitted to exterior indicator by magnetism.

1,145,005. **Electric Signal for Automobiles.** H. C. Dolan, Detroit, Mich. Mechanism for synchronously moving shutter and signal arm in direction indicator.

1,145,006. **Detachable Trolley Harp.** F. M. DuBois, Thompsonville, Conn. Harp detachably clamped to pole.

1,145,025. **Gyroscopic Steering Device.** F. M. Leavitt, assignor to E. W. Bliss Co., Brooklyn, N. Y. Steering of torpedo controlled by gyroscope driven by electric motor.

1,145,033. **Attachment Plug.** C. D. Platt, Bridgeport, Conn. Two-part, separable plug.

1,145,035. **Hair-Dressing Apparatus.** F. Savoureux, New York, N. Y. Has electric heater.

1,145,041. **Switch for Electric-Lighting Systems.** T. Spencer, assignor to Helios Mfg. Co., Philadelphia, Pa. Generator switch responsive to changes in speed of armature shaft.

1,145,046. **Ore Concentrator.** J. Weatherby, assignor to Electric Ore Separator Co., New Cumberland, Pa. Table on which stratification and separation are effected has riffle bars with magnetic terminal edges.

1,145,047 and 1,145,048. **Vacuum Cleaning Apparatus.** T. Wiedemann and J. H. Templin, assignors to Santo Mfg. Co., Philadelphia, Pa. Mounting and connections of motor.

1,145,054. **Bacterial Incubator.** J. Boekel and J. H. Scherer, assignors to Boekel. Refrigerator and thermostatically controlled electric heater maintain temperature of incubating chamber.

1,145,057. **Electrical Fitting.** R. W. Davenport, assignor to Detroit Stove Works, Detroit, Mich. Combined switch and fuse block for heater.

1,145,066. **Transmitting Apparatus for Wireless Telegraphy.** A. H. Johnson, assignor to National Electrical Supply Co., Washington, D. C. Controlled by key in field of alternator which supplies energy and has flywheel for storing energy.

1,145,081. **Dynamo-Electric Machine.** P. P. Politowski, Chicago, Ill. Field-pole structure.

1,145,087. **Illuminated Fender.** E. D. Shaw, Syracuse, N. Y. Light on front of wheel guard.

1,145,105. **Case for Incandescent Electric Lamp Sockets.** A. Weber, Sr., assignor to Weber Electric Co., Schenectady, N. Y. Telescoping sections snap together and are released by compressing inner one.

1,145,109. **Telephone System.** J. L. Wright, assignor to F. C. Stevens, Attica, N. Y. Automatic, with provision for selecting another link if first one chosen is abnormal.

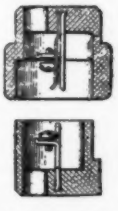
1,145,116. **Alternating-Current Rectifier and Rectifying System.** J. Chesler, assignor to New Jersey Patent Co., West Orange, N. J. Arrangement of direct and alternating-current magnets with pole-changer.

1,145,120. **Telephone Exchange System.** E. E. Clement, assignor to F. C. Stevens, Attica, N. Y. Semi-automatic; automatic branch exchanges connect with central exchange.

1,145,129. **Street-Cleaning Machine.** A. S. Emerson, assignor to Emerson Contracting Co., New York, N. Y. Suction cleaner with gas-electric propulsion and operation.

1,145,140. **Apparatus for Treating Liquids with Ultra-Violet Rays.** V. Henri, ... Helbronner and M. von Recklinghausen, assignors to R. U. V. Co., New York, N. Y. Structure of vessel for holding liquid.

1,145,152. **Credit Marking System.** J. J. Leidigh, assignor to National Cash Register Co., Dayton, O. Telephonic; devices at central credit office electromagnetically punch checks at substations.



No. 1,145,424.—Connector.

1,145,213. **Device for Incandescent Lamps with Metal Filaments.** C. G. H. Remane, assignor to General Electric Co., Schenectady, N. Y. Relates to the filament support.

1,145,218. **Humidor.** W. E. Schimmel, Watertown, Wis. Structure comprises electric heater for producing vapor.

1,145,224. **Combined Automatic Burglar and Fire-Alarm System.** O. Asmussen, Brooklyn, N. Y. Automatic switches at subscribers' stations operated by alarms to signal central station.

1,145,229. **Telegraph System.** W. M. Bruce, Jr., assignor to United Telegraph & Cable Co., Springfield, O. Alternating-current, tape-recording system.

1,145,232. **Ignition System for Internal-Combustion Engines.** W. W. Dean, Chicago, Ill. Timer specially adapted for advancing spark.

1,145,235. **Circuit-Breaker.** L. L. Elden, assignor to General Electric Co. Laminated brush and carbon break; trip releases gravity device which breaks holding toggle.

1,145,239. **System for Direct Energization of Radiotelegraphic Antennae.** E. Girardeau and J. Bethenod, Paris, France. Provides for uniform vigorous charging of the antennae by two phases.

1,145,245. **Telephone-Exchange System.** M. L. Johnson, assignor to Frank B. Cook Co., Chicago, Ill. Trunk lines between boards have automatic switches for selecting idle operators' receivers.

1,145,253. **Electric Bell.** C. F. Mead and L. E. Richmond, assignors to Mead Electric Signal Co., Cleveland, O. Electromagnetic striking mechanism for gong.

1,145,287. **Telephonic-Telegraphic Communication System for Railroad Trains.** F. Arena, assignor of one-fourth each to O. Scotto, G. Carpaneto and R. Maggio, New York, N. Y. Structure of contact shoe.

1,145,328. **Electric Train-Lighting System.** J. F. McElroy, assignor to Central Trust Co. of New York, N. Y. Battery and axle-driven dynamo equipment on each car connected by voltage-reducing train line.

1,145,331. **Electric - Motor - Driven Coal Cutter.** R. Martin, Irvington, N. Y. Tool connected with connecting rod by magnetism and air cushion.

1,145,338. **Spring Jack.** C. H. Vanderhoof, New York, N. Y. Structural details of jack for securing to post of telegraph instrument.

1,145,339. **Electrical System of Distribution.** E. VanWagenen, assignor to Gould Storage Battery Co., New York, N. Y. Regulation of system having storage battery floated on line.

1,145,346. **Guard for Presses.** J. J. Brophy and W. C. Roche, assignors to Turner Tanning Machinery Co., Peabody, Mass. Lock for starting device electromagnetically interlocked with the guard.

1,145,348. **Synchronism Indicator.** E. D. Carter, Montclair, N. J. Requires at least one of sources shall be polyphase.

1,145,359. **Type-Setting Machine.** H. Drewell, Charlottenburg, Germany. Keyboard is electromagnetically shifted from one to another of a number of line-casting machines.

1,145,361. **Separable - Husk - Socket Fitting.** E. H. Freeman, Trenton, N. J. Details of quickly detachable socket.

1,145,366. **Conical Helix.** C. D. Herrold, San Jose, Cal. Loose-coupled oscillating transformer having conical-shaped spirally wound primary and secondary.

1,145,374. **Combined Electric-Lamp Socket, Holding Shell and Shade-Holder.** H. W. Lawrence, Denver, Colo. Rectangular shade-holder base secured to shell by tongues sprung over rectangular bead.

1,145,382 and 1,145,383. **Electric Lamp Fixtures.** A. C. McWilliams, Chicago, Ill. First patent, shade and spring-supported socket independently vertically adjustable. Second patent, modified supporting means

for socket with shade connected by bayonet joint.

1,145,393. Cooler for Telephone Instruments. W. P. Stunz, assignor to Webb Talking Pictures Co., Lansdowne, Md. Has chamber for circulation of cooling agent in granular transmitter.

1,145,413. Welding Machine. A. S. Hatch, assignor to T. H. Ferguson, Oak Park, Ill. Details of frame and transformer structure in spot welder.

1,145,424. Separable Connector for Electrical Conductors. C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Insures proper angular relation and prevents relative rotation of parts. (See cut.)

1,145,431. Power Transmission. G. G. Milne, assignor to Gould Coupler Co., New York, N. Y. Breakable connection between dynamo and driving car-axle when dynamo is stopped, to prevent breakage of other parts.

1,145,435. Starting Device for Internal-Combustion Engines. W. J. Perkins, Grand Rapids, Mich. Igniter circuit opened when spark is advanced and during cranking prevents "kicking" operator.

1,145,436. Safety Starting Device. W. J. Perkins. Modification of above.

1,145,453. Circuit-Controlling Device. P. H. Zimmer, assignor to Cutler-Hammer Mfg. Co. Automatic, electromagnetic resistance control for motor.

1,145,460. Printing-Telegraph System and Alphabet. C. G. Ashley, assignor to General Engineering & Construction Co., Toronto, Canada. Printing pens selected by impulses varying in intensity and polarity.

1,145,465. Means for Driving Dynamos From Car-Axles. W. F. Bouche, assignor to Gould Coupler Co., Depew, N. Y. Driving gearing.

1,145,468. Electric-Lighting System for Cars. J. L. Creveling, assignor to Safety Car Heating & Lighting Co., New York, N. Y. Axle-driven system wherein undirectional movement of generator is assured and speed regulated.

1,145,473. Railroad Appliance. N. L. Faufata, Paia, Hawaii. Air-brake valve electrically controlled by semaphore.

1,145,490. Printing-Telegraph Mechanism. O. L. Kleber, Pittsburgh, Pa. Type-wheel on continuously rotating shaft is clutched thereto for durations of impulses.

1,145,501. Single-Phase Motor. O. S. More and L. G. Long, assignors to Fairbanks-Morse Electrical Mfg. Co., Indianapolis, Ind. Commutator short-circuited by centrifugal device after starting.

1,145,507. Electrically Operated Vibrator. G. L. Patterson and I. F. Badeau, assignors to A. C. Patterson, New York, N. Y. Details of electric bell structure.

1,145,508. Hydroelectric Storing and Distributing System. F. C. Perkins, assignor of one-half to L. Stockton, Buffalo, N. Y. Hot water tank has water heated by circulation through transformer secondaries.

1,145,509. Electrochemical Controlling Apparatus. W. J. Pike and R. J. Sutton, Grand Rapids, Mich. Automatic control of supply of chemical and treating current at a certain point of conduit through which flows treated fluid.

1,145,542. Automatic Telephone-Switching Apparatus. J. G. Blessing, assignor to Automatic Electric Co., Chicago, Ill. Key-controlled impulse transmitter.

1,145,543 and 1,145,544. Impulse-Transmitting Device. J. G. Blessing, assignor to Automatic Electric Co. Modifications of above.

1,145,551. Transformer. J. Burke, assignor to Burke Electric Co., Erie, Pa. Details of core structure.

1,145,554. Sound Indicator. F. W. H. Clay, Pittsburgh, Pa. To increase sensibility and prevent noise, telephone receiver diaphragm is maintained in continuous vibration above limits of audibility by device independent of sound source.

1,145,563. Machine for Making Storage-Battery Plates. W. A. Crowdus, assignor to A. R. Porter, Chicago, Ill. Rolls for forming special form of plate.

1,145,565. Motor-Generator Set. C. W. Dake, assignor to Pyle-National Electric Headlight Co., Chicago, Ill. Details of housing, etc., in unit for headlight.

1,145,569. Electric Switch. W. E. Date, assignor to Automatic Refrigerating Co., Jersey City, N. J. Overload protective device having solenoid whose calibration is varied by adjusting plunger.

1,145,575. Dynamo-Electric Generator. F. Eichert, assignor to firm of Greif & Schlick, Coburg, Germany. Magneto armature has field-opposing coil which is automatically short-circuited at certain speed.

1,145,586. Electric Attachment for Ophthalmoscopes. H. G. Herold, assignor to General Optical Co., New York, N. Y. Mounting and structure of lamp and controller.

1,145,589. Portable Photographic Dark-Room Lantern Attachment. G. F. Holland, Revere, Mass. Structure adapted for mounting and housing electric lamp bulb.

1,145,593. Electrolytic Cell and Method of Maintaining the Efficiency Thereof. W. M. Jewell, assignor to Chloride Process Co., Chicago, Ill. Anode chamber liquor flows toward cathode chamber below level of cathode and then out of cell independent of outflow of cathode liquor.

1,145,594. Short-Circuiting Device for Electric Motors. C. L. Kennedy, assignor to Holtzer-Cabot Electric Co., Brookline, Mass. Centrifugally operated device connects commutator segments.

1,145,612. Dynamo-Electric Machine and Means for Cooling Same. E. H. Porter, Philadelphia, Pa. Cooling air flows through hollow interior conductors.

1,145,613. Apparatus for Holding and Cooling Bulbs of Electric Lamps. S. G. Rhodes, New York, N. Y. Globe-supporting shell directs air within globe and against lamp bulb.

1,145,632. Means for Controlling Telephone Circuits. W. C. Ude, West Haven, Conn. "Central" can restore ringing circuit if subscriber does not "hang up" at close of talk.

1,145,642. Apparatus for Electric Welding. H. R. Woodrow, assignor to T. E. Murray, New York, N. Y. Butt-welding machine in which duration of welding current is automatically controlled.

1,145,652. Direction Pointer. L. S. Alter, Los Angeles, Cal. Advertising device having pointing arrow fixed on pintle of concealed magnetic needle and at an angle thereto.

1,145,655. Starting Device for Internal-Combustion Engines. H. E. Anderson, Lakewood, O. Structure of priming plug.

1,145,658. Wireless-Telegraph Detector. W. E. Ashton and A. M. Curtis, assignors to J. O. Fowler, New York, N. Y. Wave-

No. 1,145,837.—Heat Shield.

responsive device consists of mass of red oxide of zinc.

1,145,659. Automatic Selecting Multi-party Telephone System. O. Asmussen, Brooklyn, N. Y. Has a pulsating selector at each station.

1,145,660. Machine for Mounting Incandescent Lamp Filaments. G. F. Atwood, assignor to Westinghouse Lamp Co., Pittsburgh, Pa. Details of machine.

1,145,680. System of Electric Motor Control. F. D. Hallock, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. "Foolproof" resistance starter.

1,145,692. Automobile Number Light. S. J. Lessing, Chicago, Ill. Arrangement of box, lamp, reflector, etc., to prevent tampering.

1,145,707. Mounting for Incandescent Lamp Filaments. C. F. Scott, assignor to Westinghouse Lamp Co. Manner of supporting the filament mounting.

1,145,709. Ratchet Mechanism. W. C. Starkey, Mansfield, O. Electromagnetic step-by-step signal device.

1,145,717. Electrical Receptacle. G. B. Thomas, assignor to Bryant Electric Co., Bridgeport, Conn. Frictionally grips lamp base to prevent accidental rotary displacement.

1,145,721. Dynamo-Electric Machine. M. Walker, assignor to Westinghouse Electric & Mfg. Co. Polyphase generator supplies excitation to its field from star-connected armature through a cummutator.

1,145,735. Electric Wave Detector. C. D. Ainsworth, Worcester, Mass. Comprises radio-active substance near cathode, anode and neutral electrode in rarefied atmosphere.

1,145,747. Process for the Manufacture of Aluminum Nitride. P. Bunet, assignor to Societe Generale des Nitrures, Paris, France. Passes continuously through electric furnace reactionary materials mixed with conducting materials which are magnetically separated after operation.

1,145,748. Electric Furnace. P. Bunet, assignor to Societe Generale des Nitrures. Structure of furnace for above.

1,145,751. Appliance for Telephones. J. L. Creveling, New York, N. Y. Provides means for attaching additional ear piece to ordinary receiver.

1,145,763. Fire Alarm. E. E. Fryberg, assignor of one-third each to L. Berglund and J. Carlson, Duluth, Minn. Sounding of alarm bell lifts telephone receiver from hook.

1,145,764. Electric Switch Lock. E. M. Fuller, Grand Rapids, Mich. Removable key controls locking of switch case to support and operation of switch in case.

1,145,787. Electrically Operated Mine Door. W. W. Murray and J. F. Dillon, Dearing, W. Va. Auxiliary car-operated door-opening means automatically thrown in if main means fails.

1,145,835. Maximum-Demand Meter. C. I. Hall, assignor to Chicago Electric Meter Co., Chicago, Ill. Step-by-step maximum indicator driven electromagnetically by integrating mechanism during predetermined intervals.

1,145,837. Heat Shield for Incandescent Electric Lamps. E. R. Hoff, New York, N. Y. Bulb-shaped receptacle for lamp has vacuum between double walls. (See cut.)

1,145,839. Diaphragm Horn. M. R. Hutchinson, assignor to Lovell-McConnell Mfg. Co., Summit, N. J. Diaphragm vibrated by electric motor shaft normal thereto.

1,145,840. Paper-Feeding, Detecting and Rejecting Device for Printing Presses. M. M. Kandle, assignor to Kandle-Born Co., Springfield, Mass. Electrical detecting means for rejecting improperly positioned sheets.

1,145,843. Combined Lamp Bracket and Signal. C. G. Mollan, Chicago, Ill. Automobile direction signal and license-number illuminator.

1,145,848. Illuminated Note-Pad. T. Robins, New York, N. Y. Writing tablet has lamp and battery.

1,145,860. Steam Meter. R. Burnham, Chicago, Ill. Related to No. 1,144,998.

1,145,861. Telephony. W. W. Dean, assignor to Garford Mfg. Co., Elyria, O. Structural details of desk set.

1,145,862. Apparatus for Electrolytic Purification of Liquids. J. L. Goucher, assignor to New York Conveyancers Co., New York, N. Y. Liquid forms current conductor from one vessel-shaped electrode to another.

Reissue, 13,942. Sanitary Mouthpiece. Ed. M. Jenkins, Italy, Tex. For telephone transmitters; special disinfectant device.

Patents Expired.

The following United States electrical patents expired on July 19, 1915:

607,451. Electromagnetic Motor. A. B. McMilan, New York, N. Y.

607,476. Weighing Machine. F. H. Richards, Hartford, Conn.

607,540. Electrical Resistance. H. S. Chase, Boston, Mass.

607,551. Electric Regulator. J. A. Powers, Lansington, N. Y.

607,589. Electric Arc Lamp. J. H. J. Haines, New York, N. Y.

607,590. Galvanic Cell. A. Heil, Fränkish Crumbach, Germany.

607,593. Dynamo-Electric Machine. W. B. Sayers, Glasgow, Scotland.

607,608. Rheostat. M. J. Shiels, Westfield, N. J.

607,609. Field Magnet for Electric Machines. S. H. Short, Cleveland, O.

607,610 and 607,611. Electric-Railway System. S. H. Short.

607,617. Regulating Switch for Electric Circuits. H. P. Davis, Pittsburgh, and G. Wright, Wilkinsburg, Pa.

607,621. System of Electrical Distribution. B. G. Lamme, Pittsburgh, Pa.

607,638. Electric Line Switch. A. B. duPont. Detroit, Mich.

607,646. Electrolytic Bath. P. Marino, Paris, France.

607,672. Controller. T. von Zweigbergk, Cleveland, O.

607,697. Electric Railroad. C. A. Myers, Atlantic City, N. J.

607,714. Electric Stop-Motion for Looms. A. Stephens, Guadalajara, Mexico.

607,715. Voltmeter. J. F. Stevens, Philadelphia, Pa.

607,737. Dynamo-Electric Machine. A. G. Eigner, St. Petersburg, Russia.

607,745. Electric Buoy. E. W. G. C. Hoffmann, Charlottenburg, Germany.

607,746. Bond for Electric Conductors. S. W. Huff, Baltimore, Md.

607,760. Circuit Arrangement for Electrical Apparatus. J. Miesler, Vienna, Austria-Hungary.

607,801. Long-Distance Telephone. P. de Kilduchevcky, London, England.